D-Link
Building Networks for People

DES-3226L

Release 3

Layer 2 Switch

24 Port 10/100 Managed Switch
Plus 2 Combo Gigabit Copper/SFP Ports

Web User Guide

Business Class Networking

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About This Book

This document describes the D-Link™ DES-3226L hardware and software installation process, and provides an understanding of the CLI and Web configuration options for features in this release. It provides basic information to install, configure, and operate the D-Link DES-3226L switch. For more information, go to the D-Link Support web site at http://support.dlink.com/ for the latest updates on documentation and software.

Document Organization

This document contains sections to help you:

- Install the D-Link DES-3226L switch and prepare it for installing the D-Link DES-3226L software package
- Install the D-Link DES-3226L software

This document also describes the use of the CLI and web interfaces and gives configuration information about the following:

- IGMP Snooping
- Configuration Scripting
- Port Mirroring
- Syslog
- Traceroute
- VLANs
- Link Aggregation
- Class of Service

Warranty, registration, and international technical support contact information appear at the end of the document.

Audience

Use this guide if you are:

- Network manager familiar with network management concepts and terminology.
- System administrator who is responsible for configuring and operating a network.
- Level 1 and Level 2 Support.

You should have a basic knowledge of Ethernet and networking concepts.

Related Documentation

The *D-Link* DES-3226L *CLI Guide* provides information about the CLI commands used to configure the switch. The document provides command mode descriptions and descriptions, syntax, and default values for individual commands.

Trademarks

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D-Link Offices for Registration and Warranty Service

The Registration section at the back of this manual contains a web address for registering this product.

To obtain an RMA number for warranty service as to a hardware product, or to obtain warranty service as to a software product, contact the D-Link office nearest you. An address/telephone/fax/e-mail/Web site list of D-Link offices is provided in the back of this manual.

Features

This version of D-Link's networking software includes the following features:

- Layer 2 Features
  - IEEE 802.1Q VLAN operation
  - VLAN Tagging
  - Link Aggregation
  - Bridging Support
  - Multiple Spanning Tree
  - Rapid Spanning Tree
  - Spanning Tree
  - Virtual LANs/Port-based VLANs
  - Ethernet Priority with User Provisioning and Mapping
  - Port Based Authentication
  - Flow Control
  - IGMP Snooping
  - Port Mirroring
  - Broadcast Storm Control
  - Multicast Storm control
  - XMODEM

- Support for:
  - User Datagram Protocol (UDP)
  - Trivial File Transfer Protocol (TFTP)
  - Internet Protocol (IP)
  - Internet Control Message Protocol (ICMP)
  - TCP
  - Bootstrap Protocol (BootP)
  - Interoperability between BootP and Dynamic Host Configuration Protocol (DHCP)
  - DHCP Client
  - DHCP Options and BootP Vendor Extensions
  - RADIUS Client
  - RADIUS Accounting
  - RADIUS Attributes for Tunnel Protocol support
  - RADIUS Extensions
  - RADIUS Support for EAP
  - 802.1x RADIUS Usage Guidelines
  - Private Edge VLANs
- Quality of Service
- Management Features
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  - Telnet Option
  - SMI v1, SMI v2
    - Textual Conventions for SMI v2
    - Conformance statements for SMI v2
  - Simple Network Management Protocol (SNMP)
    - Community-based SNMP v2
    - Protocol Operations for SNMP v2
    - Transport Mappings for SNMP v2
    - Management Information Base for SNMP v2
    - Coexistence between SNMP v1 and SNMP v2
    - SNMP Framework MIB
    - Architecture for Describing SNMP Management Frameworks
    - Message Processing and Dispatching
    - View-based Access Control Model
    - Coexistence between SNMP v1, v2, and v3
    - SNMB v3 Applications
    - User Based Security Model for SNMP v3
  - Concise MIB Definitions
  - HTML/2.0 Forms with File Upload Extensions
  - HTTP/1.1 Protocol per draft-ietf-http-v11-spec-rev-03
  - Transparent Content Negotiation
  - Remote Variant Selection
  - HTML 4.0 Specification
  - Java and Java Script 1.3
  - Configurable Management VLAN ID
  - Industry Standard CLI
  - Logging
  - Configuration Migration

- Layer 2 MIBs
  - MIB-II
  - Bridge MIB
  - Ethernet-like MIB
  - The Interfaces Group MIB using SMI v2
  - RADIUS Authentication Client MIB
  - RADIUS Accounting MIB
  - VLAN and Ethernet Priority MIB
  - RMON Groups 1,2,3, and 9
  - Internet Addresses MIB
  - IANA-ifType-MIB
  - IEEE 802.1x MIB (IEEE8021-PAE-MIB)
  - IEEE 802.3AD MIB (IEEE8021-AD-MIB
  - Enterprise MIB - Support for all managed objects not contained in standards-based MIBs according to the functions listed above

Product Overview

This section contains an overview and technical specifications of the D-Link DES-3226L switch.

The D-Link DES-3226L is a high-performance Fast Ethernet switch that provides 24 10/100 Mbps switched ports with two combo gigabit copper/Small Form Factor Pluggable (SFP) ports. The switched 10/100 Mbps ports are ideal for segmenting networks into small, connected sub networks for superior performance, enabling the most demanding multimedia and imaging applications over the network. The two fixed-in gigabit copper ports support 10/100/1000BASE-T speed. There are also two SFP ports that provide optional fiber gigabit uplinks. These SFP ports are associated with the gigabit copper ports, so that if the SFP ports are used, the gigabit copper ports are disabled.

Notes, Notices, and Cautions

A **NOTE** indicates important information that helps you make better use of your device.

A **CAUTION** ⚠ indicates a potential for property damage, personal injury, or death.

Safety Instructions

Use the following safety guidelines to ensure your own personal safety and to help protect your system from potential damage. Throughout this safety section, the caution icon (⚠) is used to indicate cautions and precautions that you need to review and follow.

Safety Cautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions.

- Observe and follow service markings.
  - ♦ Do not service any product except as explained in your system documentation.
  - ♦ Opening or removing covers that are marked with the triangular symbol with a lightning bolt may expose you to electrical shock.
  - ♦ Only a trained service technician should service components inside these compartments.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:
  - ♦ The power cable, extension cable, or plug is damaged.
  - ♦ An object has fallen into the product.
  - ♦ The product has been exposed to water.
  - ♦ The product has been dropped or damaged.
  - ♦ The product does not operate correctly when you follow the operating instructions.
- Keep your system away from radiators and heat sources. Also, do not block cooling vents.
- Do not spill food or liquids on your system components, and never operate the product in a wet environment. If the system gets wet, see the appropriate section in your trouble-shooting guide or contact your trained service provider.

- Do not push any objects into the openings of your system. Doing so can cause fire or electric shock by shorting out interior components.
- Use the product only with approved equipment.
- Allow the product to cool before removing covers or touching internal components.
- Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company.
- To help avoid damaging your system, be sure the voltage selection switch (if provided) on the power supply is set to match the power available at your location:
  - 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as South Korea and Taiwan
  - 100 V/50 Hz in eastern Japan and 100 V/60 Hz in western Japan
  - 230 V/50 Hz in most of Europe, the Middle East, and the Far East
- Also, be sure that attached devices are electrically rated to operate with the power available in your location.
- Use only approved power cable(s). If you have not been provided with a power cable for your system or for any AC powered option intended for your system, purchase a power cable that is approved for use in your country. The power cable must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product.
- To help prevent electric shock, plug the system and peripheral power cables into properly grounded electrical outlets.
- These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a 3-wire cable with properly grounded plugs.
- Observe extension cable and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cable or power strip does not exceed 80 percent of the ampere ratings limit for the extension cable or power strip.
- To help protect your system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Position system cables and power cables carefully; route cables so that they cannot be stepped on or tripped over. Be sure that nothing rests on any cables.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications.
- Always follow your local/national wiring rules.
- When connecting or disconnecting power to hot-pluggable power supplies, if offered with your system, observe the following guidelines:
  - Install the power supply before connecting the power cable to the power supply.
  - Unplug the power cable before removing the power supply.
  - If the system has multiple sources of power, disconnect power from the system by unplugging all power cables from the power supplies.
- Move products with care; ensure that all casters and/or stabilizers are firmly connected to the system. Avoid sudden stops and uneven surfaces.

General Precautions for Rack-Mountable Products

Observe the following precautions for rack stability and safety. Also, refer to “Installing in a Rack” on page 22 and the rack installation documentation accompanying the rack for specific caution statements and procedures.

- Systems are considered to be components in a rack. Thus, *component* refers to any system as well as to various peripherals or supporting hardware.

Caution: ⚠ **CAUTION:** Installing systems in a rack without the front and side stabilizers installed could cause the rack to tip over, potentially resulting in bodily injury under certain circumstances. Therefore, always install the stabilizers before installing components in the rack. After installing system/components in a rack, never pull more than one component out of the rack on its slide assemblies at one time. The weight of more than one extended component could cause the rack to tip over and may result in serious injury.

- Before working on the rack, make sure that the stabilizers are secured to the rack, extended to the floor, and that the full weight of the rack rests on the floor. Install front and side stabilizers on a single rack or front stabilizers for joined multiple racks before working on the rack.
- Always load the rack from the bottom up, and load the heaviest item in the rack first.
- Make sure that the rack is level and stable before extending a component from the rack.
- Use caution when pressing the component rail release latches and sliding a component into or out of a rack; the slide rails can pinch your fingers.
- After a component is inserted into the rack, carefully extend the rail into a locking position and then slide the component into the rack.
- Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.
- Ensure that proper airflow is provided to components in the rack.
- Do not step on or stand on any component when servicing other components in a rack.

NOTE: A qualified electrician must perform all connections to DC power and to safety grounds. All electrical wiring must comply with applicable local or national codes and practices.

Caution: ⚠ **CAUTION:** Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

⚠ **CAUTION**: The system chassis must be positively grounded to the rack cabinet frame. Do not attempt to connect power to the system until grounding cables are connected. Completed power and safety ground wiring must be inspected by a qualified electrical inspector. An energy hazard will exist if the safety ground cable is omitted or disconnected.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your system. To prevent static damage, discharge static electricity from your body before you touch any of the electronic components, such as the microprocessor. You can do so by periodically touching an unpainted metal surface on the chassis.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

1. When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your system. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
2. When transporting a sensitive component, first place it in an antistatic container or packaging.
3. Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads, workbench pads and an antistatic grounding strap.

Switch Description

D-Link's DES-3226L switch is a high port-density Layer 2 switch that combines ultimate performance with fault tolerance, security, and management functions with flexibility and ease-of-use.

The D-Link DES-3226L switch has a combination of 1000BASE-T ports and SFP ports that may be used in uplinking various network devices to the switch (including PCs, hubs, and other switches) to provide a gigabit Ethernet uplink in full-duplex mode. The Small Form Factor Pluggable (SFP) combo ports are to be used with fiber-optical transceiver cabling in order to uplink various other networking devices for a gigabit link that may span great distances. These SFP ports support full-duplex transmissions, have auto-negotiation, and can be used with DEM -310GT (1000BASELX) and DEM-311GT (1000BASE-SX) transceivers.

NOTE: The SFP combo ports on the switch cannot be used simultaneously with the corresponding 1000BASE-T ports. If both ports are in use at the same time (for example, port 25 of the SFP and port 25 of the 1000BASE-T), the SFP ports will take priority over the combo ports and render the 1000BASE-T ports inoperable.

Technical Specifications

This section displays specifications for the D-Link DES-3226L switch as follows:

- General specifications
- Physical and environmental specifications
- Performance

Table 1. General Specifications

Specifications	Description
Standards	IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100BASE-TX Fast Ethernet IEEE 802.3ab 1000BASE-T Gigabit Ethernet IEEE 802.3x Full Duplex Flow Control IEEE 802.3z 1000BASE-SX/LX Gigabit Ethernet
Protocol	CSMA/CD
Data Transfer Rate	Ethernet: 10Mbps (half duplex), 20Mbps (full-duplex) Fast Ethernet: 100Mbps (half duplex), 200Mbps (full-duplex) Gigabit Ethernet: 2000Mbps (full-duplex)
Topology	Star
Network Cables	10BASET: 2-pair UTP Cat. 3, 4, 5; up to 100m 100BASE-TX: 2-pair UTP Cat. 5; up to 100m 1000BASE-T: 4-pair UTP Cat. 5; up to 100m Fiber module: mini-GBIC Fiber module
Number of Ports	24 × 10/100 Mbps Auto-MDIX RJ-45 ports 2 × combo gigabit copper/SFP ports

Table 2. Physical and Environmental Factors

Feature	Description
AC inputs	100-240V AC, 50/60 Hz internal universal power supply
Power Consumption	9.5 Watts (Max)
Temperature	Operating: 0 ~ 50° C, Storage: -10 ~ 70° C
Humidity	Operating: 10% ~ 90%, Storage: 5% ~ 90%
Dimensions	440 x 210 x 44 mm/17.4 x 8.3 x 1.8 inches (W x D x H)
EMI:	FCC Class A, CE Mark Class A, VCCI Class A
Safety:	CUL, LVD

Table 3. Performance

Feature	Description
Transmits Method:	Store-and-forward
Filtering Address Table:	8K entries per device
Packet Filtering/Forwarding Rate:	10Mbps Ethernet: 14,880/pps 100Mbps Fast Ethernet: 148,800/pps 1000Mbps Gigabit Ethernet: 1,488,000/pps
MAC Address Learning:	Automatic update
Transmits Method:	Store-and-forward
RAM Buffer:	256K bytes per device

Installing the Hardware

This chapter provides instructions for installing the D-Link DES-3226L switch hardware. The following sections describe this installation process.

Preparing the Site for Installation

D-Link DES-3226L switches can be mounted in a standard 48.26-cm (19-inch) rack or left freestanding (placed on a tabletop).

Before installing the switch or switches, make sure that the chosen installation location meets the following site requirements:

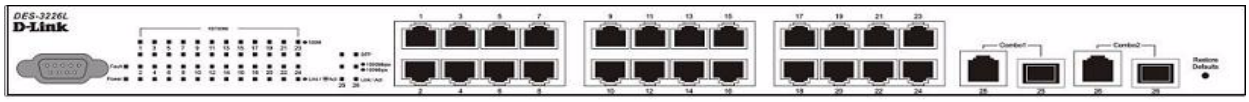
- **Power** — The switch is installed near an easily accessible 100–250 VAC, 50–60 Hz outlet.
- **General** — The power supply is correctly installed by checking that the LEDs on the front panel are illuminated.
- **Clearance** — There is adequate frontal clearance for operator access. Allow clearance for cabling, power connections, and ventilation.
- **Cabling** — The cabling is routed to avoid sources of electrical noise such as radio transmitters, broadcast amplifiers, power lines, and fluorescent lighting fixtures.
- **Ambient** — The ambient switch operating temperature range is 0 to 50ºC (32 to 122ºF) at a relative humidity of 10 to 90 percent, non-condensing.

Installing the D-Link DES-3226L Switch

This section discusses installing the D-Link DES-3226L switch.

NOTE: Before unpacking the switch, inspect the container and report any evidence of damage.

Figure 1. D-Link DES-3226L - Front View



Unpacking the Switch

1. Place the container on a clean flat surface and cut all straps securing the container.
2. Unpack the DES-3226L switch from the box. Save the packing material and box. Open the shipping carton of the switch and carefully unpack its contents. The carton should contain the following items:
   - One DES-3226L stand-alone switch
   - One AC power cord
   - Rack mount kit (two brackets and screws)
   - Four rubber feet with adhesive backing
   - RS-232 console cable
   - Manual CD

NOTE: If any item is found missing or damaged, please contact your local D-Link Reseller for replacement.

3. Carefully remove the switch from the container and place it on a secure and clean surface. See Section "Setting up the Switch."
4. Remove all packing material.
5. Inspect the product and accessories for damage. Report any damage immediately.

Setting up the Switch

The site where you install the switch may greatly affect its performance. Please follow these guidelines for setting up the switch.

- Install the switch on a sturdy, level surface that can support at least 6.6 lb. (3 kg) of weight. Do not place heavy objects on the switch.
- Ensure that the power outlet is within 1.82 meters (6 feet) of the switch.
- Visually inspect the power cord and see that it is fully secured to the AC power port. See Section "Connecting the Switch to a Power Supply."
- Make sure that there is proper heat dissipation from and adequate ventilation around the switch. Leave at least 10 cm (4 inches) of space at the front and rear of the switch for ventilation.
- Install the switch in a fairly cool and dry place for the acceptable temperature and humidity operating ranges.
- Install the switch in a site free from strong electromagnetic field generators (such as motors), vibration, dust, and direct exposure to sunlight.
- When installing the switch on a level surface, attach the rubber feet to the bottom of the device. The rubber feet cushion the switch, protect the casing from scratches, and prevent it from scratching other surfaces.

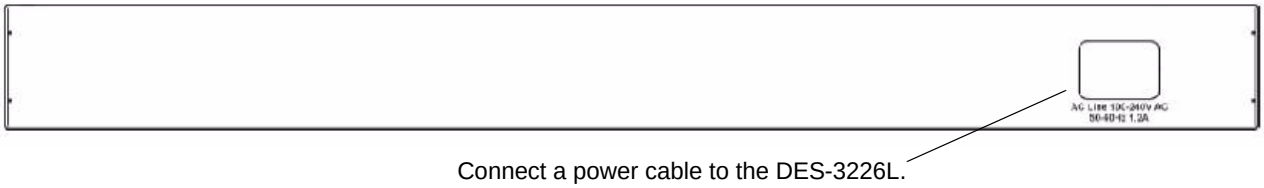
Connecting the Switch to a Power Supply

1. Connect one end of the AC power cable to the AC power connector located on the back panel (see Figure 2) and the other end into the local power source outlet.

NOTE: Do not connect the power cable to a grounded AC outlet at this time. Connect the switch to a power source as described in the step detailed in "Starting and Configuring the Switch" on page 23."

NOTE: Read the safety information in the *Product Information Guide* as well as the safety information for other switches that connect to or support the switch.

Figure 2. Connecting Power Cable



2. After the switch is powered on, the LED indicators momentarily blink and then display solidly. This blinking of the LED indicators represents a reset of the system.

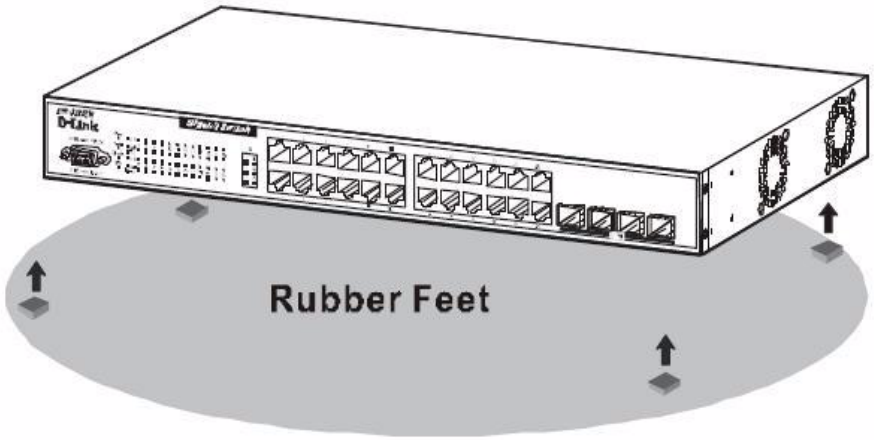
Caution: ⚠ **CAUTION:** As a precaution, in the event of a power failure, **unplug the switch**. When power is resumed, plug the switch back into the wall outlet.

Installing on a Flat Surface (Free-standing Switch)

Install the switch on a flat surface if you are not installing it in a rack. The surface must be able to support the weight of the switch and the switch cables.

1. Attach the self-adhesive rubber pads on each location marked on the bottom of the chassis.

Figure 3. Prepare the Switch for Installation on a Desktop or Shelf



2. Set the switch on a flat surface, leaving 5.08 cm (2 inches) on each side and 12.7 cm (5 inches) at the back.
3. Make sure that the switch has proper ventilation.

Installing in a Rack

The D-Link DES-3226L switch can be mounted in a standard 19” rack.

Caution: ⚠ **CAUTION:** Do not use rack mounting kits to suspend the switch from under a table or desk or attach it to a wall.

Caution: ⚠ **CAUTION:** Disconnect all cables from the switch before continuing. Remove all self-adhesive pads from the underside of the switch if they have been attached.

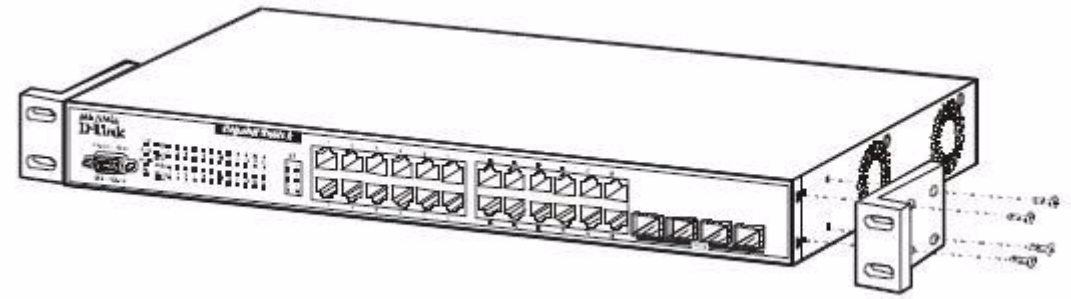
Caution: ⚠ **CAUTION:** When mounting multiple switches into a rack, mount the switches from the bottom up.

Caution: ⚠ **CAUTION:** Make sure that the supplied rack bolts fit the pre-threaded holes in the rack.

1. Place the supplied rack-mounting bracket on one side of the switch, ensuring that the mounting holes on the switch line up to the mounting holes in the rack-mounting bracket. Figure 4 illustrates where to mount the brackets.

Figure 4. Attaching the Brackets

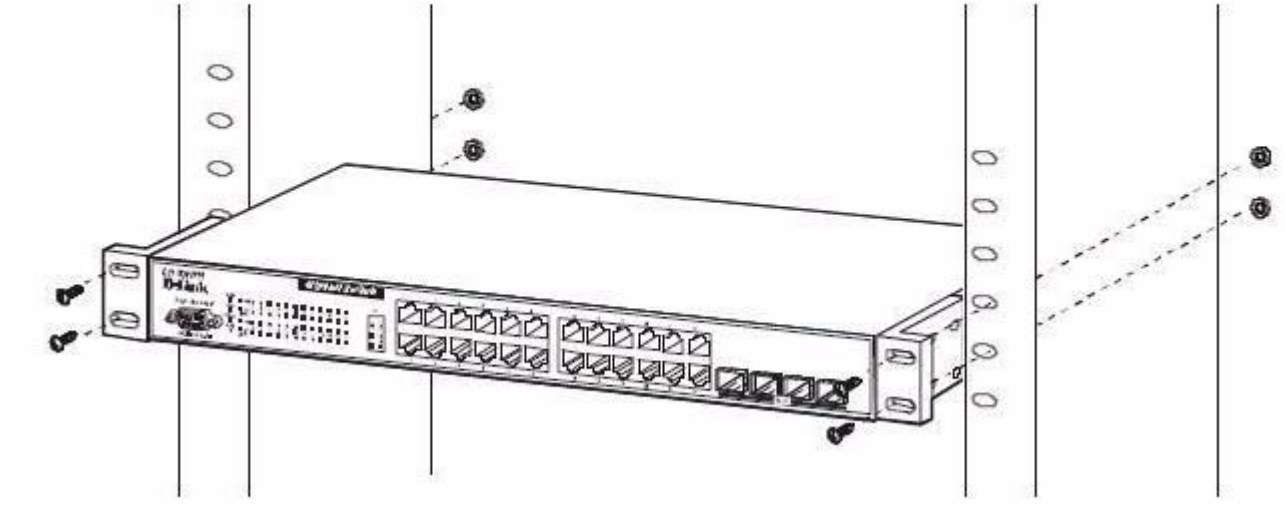
Note: This figure is not an actual DES-3226L. It is used for explanatory purposes only.



2. Insert the supplied bolts into the rack-mounting holes and tighten with a screwdriver.
3. Repeat the process for the rack-mounting bracket on the other side of the switch.
4. Insert the switch into the 48.26 cm (19 inch) rack, ensuring that the rack-mounting holes on the switch line up to the mounting holes in the rack.

Figure 5. Installing the DES-3226L in a Rack

Note: This figure is not an actual DES-3226L. It is used for explanatory purposes only.



5. Secure the switch to the rack with either the rack bolts or cage nuts and cage nut bolts with washers (depending on the kind of rack you have). Fasten the bolts on bottom before fastening the bolts on top. Make sure that the ventilation holes are not obstructed.

Starting and Configuring the Switch

After completing all external connections, connect a terminal to a switch to configure the switch. Additional advanced functions are described in the *DES-3226L CLI Guide* or check the D-Link Support web site at http://support.dlink.com/ for the latest updates on documentation and software.

NOTE: Read the release notes for this product before proceeding. You can download the release notes from the D-Link Support website at http://support.dlink.com/.

NOTE: We recommend that you obtain the most recent version of the user documentation from the D-Link Support website at http://support.dlink.com/.

Configuring for In-band Connectivity

In-band connectivity allows you to access the D-Link DES-3226L from a remote workstation using the Ethernet network. To use in-band connectivity, you must configure the DES-3226L with IP information (IP address, subnet mask, and default gateway).

Configure for In-band connectivity using one of the following methods:

- BootP or DHCP
- RS-232 port

Using BootP or DHCP

You can assign IP information initially over the network or over the Ethernet service port through BootP or DHCP. The DES-3226L has BootP enabled.

You need to configure the BootP or DHCP server with information about the DES-3226L — obtain this information through the serial port connection using the **show network** command. Set up the server with the following values:

IP Address

Unique IP address for the DES-3226L. Each IP parameter is made up of four decimal numbers, ranging from 0 to 255. The default for all IP parameters is zeroes (0.0.0.0).

Subnet

Subnet mask for the LAN

gateway

IP address of the default router, if the switch is a node outside the IP range of the LAN

MAC Address

MAC address of the DES-3226L

When you connect the DES-3226L to the network for the first time after setting up the BootP or DHCP server, it is configured with the information supplied above. The DES-3226L is ready for in-band connectivity over the network.

If you do not use BootP or DHCP, access the switch through the RS-232 port, and configure the network information as described below.

Using the RS-232 Port

You can use a locally or remotely attached terminal to configure in-band management through the RS-232 port.

1. To use a locally attached terminal, attach one end of a null-modem serial cable to the RS-232 port of the switch and the other end to the COM port of the terminal or workstation.
   For remote attachment, attach one end of the serial cable to the RS-232 port of the switch and the other end to the modem.

NOTE: You must use the cable that was shipped with the D-Link DES-3226L.

2. Set up the terminal for VT100 terminal emulation.
   A. Set the terminal ON.
   B. Launch the VT100 application.
   C. Configure the COM port as follows:
      I. Set the data rate to 115,200 baud.
      II. Set the data format to 8 data bits, 1 stop bit, and no parity.
      III. Set the flow control to none.
      IV. Select the proper mode under **Properties**.
      V. Select Terminal keys.
3. The Log-in User prompt displays when the terminal interface initializes.

   Enter an approved user name and password. The default is *admin* for the user name and the *pass-*

word is blank.

The DES-3226L is installed and loaded with the default configuration.

4. Reduce network traffic by turning off the Network Configuration Protocol. Enter the following command:

   `configure network protocol none`

5. Set the IP address, subnet mask, and gateway address by issue the following command:

   `config network parms` *`ipaddress netmask gateway`*

IP Address

Unique IP address for the DES-3226L. Each IP parameter is made up of four decimal numbers, ranging from 0 to 255. The default for all IP parameters is zeroes (0.0.0.0).

Subnet

Subnet mask for the LAN.

gateway

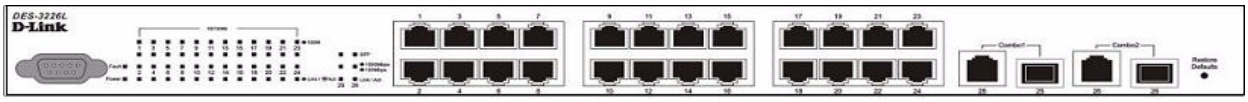
IP address of the default router, if the switch is a node outside the IP range of the LAN.

6. To enable these changes to be retained during a reset of the DES-3226L, type **Ctrl-Z** to return to the main prompt, type **save config** at the main menu prompt, and type **y** to confirm the changes.
7. To view the changes and verify in-band information, issue the command: **show network**.
8. The DES-3226L is configured for in-band connectivity and ready for Web-based management.

Configuring for Out-Of-Band Connectivity

To monitor and configure the switch using out-of-band connectivity, use the console port to connect the switch to a terminal desktop system running terminal emulation software. The console port connector is a male DB-9 connector, implemented as a data terminal equipment (DTE) connector.

Figure 6. D-Link DES-3226L - Front View



The following hardware is required to use the console port:

- VT100-compatible terminal, or a desktop, or a portable system with a serial port running VT100 terminal emulation software.
- An RS-232 crossover cable with a female DB-9 connector for the console port and the appropriate connector for the terminal.

Perform the following tasks to connect a terminal to the switch console port using out-of-band connectivity:

1. Connect an RS-232 crossover cable to the terminal running VT100 terminal emulation software.
2. Configure the terminal emulation software as follows:

   A. Select the appropriate serial port (serial port 1 or serial port 2) to connect to the console.

   B. Set the data rate to 115,200 baud.

C. Set the data format to 8 data bits, 1 stop bit, and no parity.

D. Set the flow control to none.

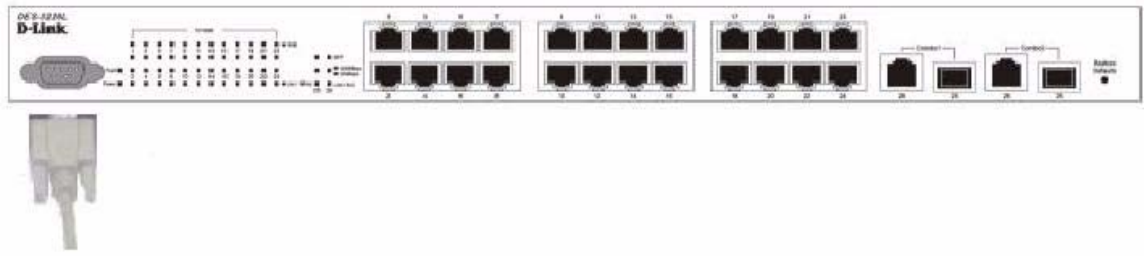
E. Select the proper mode under **Properties**.

F. Select Terminal keys.

NOTE: When using HyperTerminal with Microsoft Windows 2000, make sure that you have Windows 2000 Service Pack 2 or later installed. With Windows 2000 Service Pack 2, the arrow keys function properly in HyperTerminal's VT100 emulation. Go to www.microsoft.com for more information on Windows 2000 service packs.

3. Connect the female connector of the RS-232 crossover cable directly to the switch console port, and tighten the captive retaining screws. The DES-3226L series console port is located on the front panel as shown in Figure 7.

Figure 7. Connecting to the Console Port



Starting the Switch

1. Make sure that the switch console port is connected to a VT100 terminal or VT100 terminal emulator via the RS-232 crossover cable.
2. Locate an AC power receptacle.
3. Deactivate the AC power receptacle.
4. Connect the switch to the AC receptacle.
5. Activate the AC power receptacle.

When the power is turned on with the local terminal already connected, the switch goes through a power-on self-test (POST). POST runs every time the switch is initialized and checks hardware components to determine if the switch is fully operational before completely booting. If POST detects a critical problem, the startup procedure stops. If POST passes successfully, a valid executable image is loaded into RAM. POST messages are displayed on the terminal and indicate test success or failure. The boot process runs for approximately 60 seconds.

Initial Configuration

The initial simple configuration procedure is based on the following assumptions:

- The DES-3226L switch was not configured before and is in the same state as when you received it.
- The DES-3226L switch booted successfully.
- The console connection was established and the console prompt appears on the screen of a VT100 terminal or terminal equivalent.

The initial switch configuration is performed through the console port. After the initial configuration, you can manage the switch either from the already-connected console port or remotely through an interface defined during the initial configuration.

NOTE: The switch is not configured with a default user name and password.

NOTE: All of the settings below are necessary to allow the remote management of the switch through Telnet (Telnet client) or HTTP (Web browser).

Before setting up the initial configuration of the switch, obtain the following information from your network administrator:

- The IP address to be assigned to the management interface through which the switch is managed.
- The IP subnet mask for the network.
- The IP address of the default gateway.

Initial Configuration Procedure

You can perform the initial configuration using the D-Link Easy Setup Wizard or by using the Command Line Interface (CLI). The Setup Wizard automatically starts when the switch configuration file is empty. You can exit the wizard at any point by entering [ctrl+z]. The wizard sets up the following configuration on the switch:

- Establishes the initial privileged user account with a valid password. The wizard configures one privileged user account during the set up.
- Enables CLI login and HTTP access to use the local authentication setting only.
- Sets up the IP address for the management interface.
- Sets up the SNMP community string to be used by the SNMP manager at a given IP address. You may choose to skip this step if SNMP management is not used for this switch.
- Allows you to specify the management server IP or permit SNMP access from all IP addresses.
- Configures the default gateway IP address.

Example Session

This section describes an Easy Setup Wizard session. The following values are used by the example session:

- IP address for the management interface is 192.168.1.100:255.255.255.0.
- The user name is *admin*, and no password is needed. Type in `admin` and press Enter.
- The network management system IP address is 192.168.1.10.
- The default gateway is 192.168.1.1.

The setup wizard configures the initial values as defined above. After you complete the wizard, the system is configured as follows:

- SNMPv1/2c is enabled and the community string is set up as defined above. SNMPv3 is disabled by default.
- The admin user account is set up as defined.

- A network management system is configured. From this management station, you can access the SNMP, HTTP, and CLI interfaces. You may also choose to allow all IP addresses to access these management interfaces by choosing the (0.0.0.0) IP address.
- An IP address is configured for the default management interface (1).
- A default gateway address is configured.

NOTE: In the example below, the possible user options are enclosed in [ ]. Also, where possible, the default value is provided in { }. If you enter <Return> with no options defined, the default value is accepted. Help text is in parentheses.

The following example contains the sequence of prompts and responses associated with running an example D-Link Easy Setup Wizard session, using the input values listed above.

After the switch completes the POST and is booted, the following dialog appears:

```
U-Boot 0.3.0 (Sep 23 2005 - 14:05:10)

Board: DLink DES-3226L
DRAM: Less than 128MB hence resetting to try 64MB


U-Boot 0.3.0 (Sep 23 2005 - 14:05:10)

Board: DLink DES-3226L
DRAM: 64 MB
Flash: 8 MB
In: serial
Out: serial
Err: serial
Hit any key to stop autoboot: 0
0
## Booting image at a0400000 ...
Image Name: Linux 2.4.20
Image Type: MIPS Linux Multi-File Image (gzip compressed)
Data Size: 1876253 Bytes = 1.8 MB
Load Address: 80001000
Entry Point: 80196048
Contents:
Verifying Checksum ... OK
Uncompressing Multi-File Image ... OK

Starting kernel ...


Broadcom BCM947XX Startup Rev: 1.3

Select startup mode. If no selection is made within 3 seconds,
the Broadcom BCM947XX Application will start automatically...

1 - Start Broadcom BCM947XX Application
2 - Display Utility Menu
Select (1, 2):

Starting Broadcom BCM947XX application...


Console starting...\
SPI unit 0: Dev 0xbc20, Rev 0x01, Chip BCM5324_A1, Driver BCM5324_A1
PCI unit 1: Dev 0x4713, Rev 0x09, Chip BCM4713_A0, Driver BCM4713_A0
SPI device BCM5324_A1 attached as unit 0.
-/enable_irq(4) unbalanced from c007b7a0
Broadcom BCM47xx 10/100 Mbps Ethernet Controller 2002.9.27.0
started!

(Unit 1)>

User:
```

LED Indicators

The following table explains what the various LEDs on the switch represent when they light up.

Table 4. LED Indicators

LED	Description
Power LED	The indicator lights solid green when the switch is receiving power; otherwise, the light is off.
Fault state LED	• The light blinks green on start-up (post). • The light turns off while the system is running. • The light turns on solid green if a u-boot permanent fault occurs.
Per port Speed/Link/Activity state LED	• **Link/Act LED**: The indicators light up when there is a secure connection (or link) to an Ethernet device per port. The indicator blinks whenever there is reception or transmission (that is, Activity/Act) per port. • **Speed LED**: - When 10/100Mbps per port, the indicator light is: Green when linked to 100Mbps. Off when linked to 10Mbps. - When 10/100/1000Mbps per port, the indicator light is: Yellow when linked to 100Mbps. Light green when linked to 1000Mbps. Off when linked to 10Mbps. • **SFP LED**: The indicator lights green when linked to a SFP interface.

Software Installation

This section contains procedures to help you become acquainted quickly with the D-Link DES-3226L switch software.

Upgrading the Switch Firmware

Use the information in this section to upgrade the D-Link DES-3226L firmware to the latest version. Follow these instructions to upgrade:

1. Open your web browser to the D-Link support website: http://support.dlink.com/
2. Select your D-Link product from the drop-down: `DES 3226L`
3. Click **Go**.
4. The D-Link Switches Product Description web page appears.
5. Scroll down to the section of this web page where the Firmware tab is displayed. An example of this tab is displayed in Figure 8.

NOTE: Figure 8 is only an example. This website is updated for new firmware releases.

Figure 8. Firmware Download for D-Link DES-3226L

Firmware

Download	Type	Version	Revision Info	Date
Download Now	Firmware	2.035	× Fixed: 802.1x Shows Client is authorized but cannot pass traffic. × Fixed: Slow response time in management. × Fixed: After plugging and unplugging the root port many times clients can longer ping the DES-3226L. × Fixed: DES-3226S and DES-3226L MIB files can not co-exist in HPOV.	7/28/2005
Download Now	Firmware	2.0.13		12/20/2004
Download Now	Firmware	2.0.12	× Fixed display error on the top frame in the web interface × Fixed VLAN name length issue × Added RSTP and LACP	5/25/2004

6. Select **Download Now** for the latest version of firmware to begin your download.
7. Click **OK** on the next warning screen.
8. Click **Run** to run the upgrade from the D-Link site.

Quick Starting the Networking Device

NOTE: Before you use the information in this section, ensure that you have upgraded to the latest firmware. See “Upgrading the Switch Firmware” on page 31.

1. Read “Installing the Hardware” on page 19 for the connectivity procedure. In-band connectivity allows access to the D-Link software locally or from a remote workstation. You must configure the device with IP information (IP address, subnet mask, and default gateway).
2. Turn the Power ON.
3. Allow the device to load the software until the login prompt appears. The device initial state is called the default mode.
4. When the prompt asks for operator login, do the following steps:
   - Type `admin` at the login prompt. Since a number of the Quick Setup commands require administrator account rights, D-Link suggests logging into an administrator account.
   - Do not enter a password because the default mode does not use a password.
   - The CLI User EXEC prompt is displayed.
   - Enter `enable` to switch to the Privileged EXEC mode from User EXEC.
   - Enter `configure` to switch to the Global Config mode from Privileged EXEC.
   - Enter `exit` to return to the previous mode.
   - Enter `?` to show a list of commands that are available in the current mode.

System Information and System Setup

This section describes the commands you use to view system information and to setup the network device. Table 5 contains the Quick Start commands that allow you to view or configure the following information:

- Software versions
- Physical port data
- User account management
- IP address configuration
- Uploading from Networking Device to Out-of-Band PC (Only XMODEM)
- Downloading from Out-of-Band PC to Networking Device (Only XMODEM)
- Downloading from TFTP Server
- Restoring factory defaults

If you configure any network parameters, you should execute the following command:

```
copy system:running-config nvram:startup-config
```

This command saves the changes to the configuration file. You must be in the correct mode to execute the command. If you do not save the configuration, all changes are lost when a you power down or reset the networking device.

Table 5 describes the command syntax, the mode you must be in to execute the command, and the purpose and output of the command.

Table 5. Quick Start Commands

Command	Mode	Description
`show hardware`	Privileged EXEC	Shows hardware version, MAC address, and software version information.
`show users`	Privileged EXEC	Displays all of the users that are allowed to access the networking device. Access Mode shows whether the user is able to change parameters on the networking device (Read/Write) or is only able to view them (Read Only). As a factory default, the 'admin' user has Read/Write access and the 'guest' user has Read Only access. There can only be one Read/Write user and up to five Read Only users.
`show loginsession`	User EXEC	Displays all of the login session information.
`users passwd <username>`	Global Config	Allows the user to set passwords or change passwords needed to login. A prompt appears after the command is entered requesting the users old password. In the absence of an old password leave the area blank. User password should not be more than eight characters in length.
`copy system:running-config nvram:startup-config`	Privileged EXEC	Saves passwords and all other changes to the device. If you do not save the configuration, all changes are lost when you power down or reset the networking device.
`logout`	User EXEC Privileged EXEC	Logs the user out of the networking device.

Table 5. Quick Start Commands

Command	Mode	Description
`show network`	User EXEC	Displays the following network configuration information: • IP Address - IP Address of the interface (default: 0.0.0.0) • Subnet Mask - IP Subnet Mask for the interface (default: 0.0.0.0) • Default Gateway - The default Gateway for this interface (default: 0.0.0.0) • Burned in MAC Address - The Burned in MAC Address used for in-band connectivity • Locally Administered MAC Address - Can be configured to allow a locally administered MAC address • MAC Address Type - Specifies which MAC address should be used for in-band connectivity • Network Configurations Protocol Current - Indicates which network protocol is being used (default: none) • Management VLAN Id - Specifies VLAN id • Web Mode - Indicates whether HTTP/Web is enabled. • Java Mode - Indicates whether java mode is enabled.
`network parms` *`<ipaddr> <netmask> [gateway]`*	Privileged EXEC	Sets the IP address, subnet mask and gateway of the router. The IP address and the gateway must be on the same subnet. IP address range is from 0.0.0.0 to 255.255.255.255.
`copy nvram:startup-config` *`<tftp://<ipaddress>/<filepath>/<filename>>`*	Privileged EXEC	Starts the configuration file upload, displays the mode and type of upload and confirms the upload is progressing. The URL must be specified as: xmodem:<filepath>/<filename> For example: If the user is using HyperTerminal, the user must specify where the file is going to be received by the PC.
`copy nvram:errorlog` *`<tftp://<ipaddress>/<filepath>/<filename>>`*	Privileged EXEC	Starts the error log upload, displays the mode and type of upload and confirms the upload is progressing. The URL must be specified as: xmodem:<filepath>/<filename>
`copy nvram:traplog` *`<tftp://<ipaddress>/<filepath>/<filename>>`*	Privileged EXEC	Starts the trap log upload, displays the mode and type of upload and confirms the upload is progressing. The URL must be specified as: xmodem:<filepath>/<filename>

Table 5. Quick Start Commands

Command	Mode	Description
`copy <tftp://<ipaddress>/<filepath>/<filename>> nvram:startup-config`	Privileged EXEC	Sets the destination (download) datatype to be an image (system:image) or a configuration file (nvram:startup-config). The URL must be specified as: xmodem:<filepath>/<filename> For example: If the user is using Hyper Terminal, the user must specify which file is to be sent to the networking device. The Networking Device restarts automatically once the code has been downloaded.
`copy <tftp://<ipaddress>/<filepath>/<filename>> system:image`	Privileged EXEC	Sets the destination (download) datatype to be an image (system:image) or a configuration file (nvram:startup-config). The URL must be specified as: xmodem:<filepath>/<filename>
`copy <tftp://<ipaddress>/<filepath>/<filename>> nvram:startup-config`	Privileged EXEC	Sets the destination (download) datatype to be a configuration file. The URL must be specified as: tftp://<ipaddress>/<filepath>/<filename> Before starting a TFTP server download, you must configure the IP address.
`copy <tftp://<ipaddress>/<filepath>/<filename>> system:image`	Privileged EXEC	Sets the destination (download) datatype to be an image. The URL must be specified as: tftp://<ipaddress>/<filepath>/<filename> The system:image option downloads the code file.
`clear config`	Privileged EXEC	Enter yes when the prompt pops up to clear all the configurations made to the networking device.
`copy system:running-config nvram:startup-config`	Privileged EXEC	Enter yes when the prompt pops up that asks if you want to save the configurations made to the networking device.
`reload` (or cold boot the networking device)	Privileged EXEC	Enter yes when the prompt pops up that asks if you want to reset the system. You can reset the networking device or cold boot the networking device, both work effectively.

Using the Web Interface

This chapter is a brief introduction to the web interface.

Tip: Use the Web interface for configuration instead of the CLI interface. Web configuration is quicker and easier than entering the multiple required CLI commands.

You can manage your switch through a Web browser and Internet connection. This is referred to as Web-based management. To use Web-based management, the DES-3226L must be set up for in-band connectivity.

To access the switch, the Web browser must support:

- HTML version 4.0, or later
- HTTP version 1.1, or later
- JavaScript(TM) version 1.2, or later

This section explains how to access the switch Web-based management panels to configure and manage the switch.

Note that there are equivalent functions in the Web interface as in the terminal interface — that is, both applications usually employ the same menus to accomplish a task. For example, when you log in, there is a Main Menu with the same functions available, etc.

There are several differences between the Web and terminal interfaces. For example, on the Web interface the entire forwarding database can be displayed, while the terminal interface only displays 10 entries starting at specified addresses.

To terminate the Web login session, close the web browser.

Configuring for Web Access

To enable Web access to the switch:

1. Configure the switch for in-band connectivity. See “Configuring for In-band Connectivity” on page 23 for instructions.
2. Enable Web mode:
   A. At the CLI prompt, enter the **show network** command.
   B. Set **Web Mode** to Enabled.

Web Page Layout

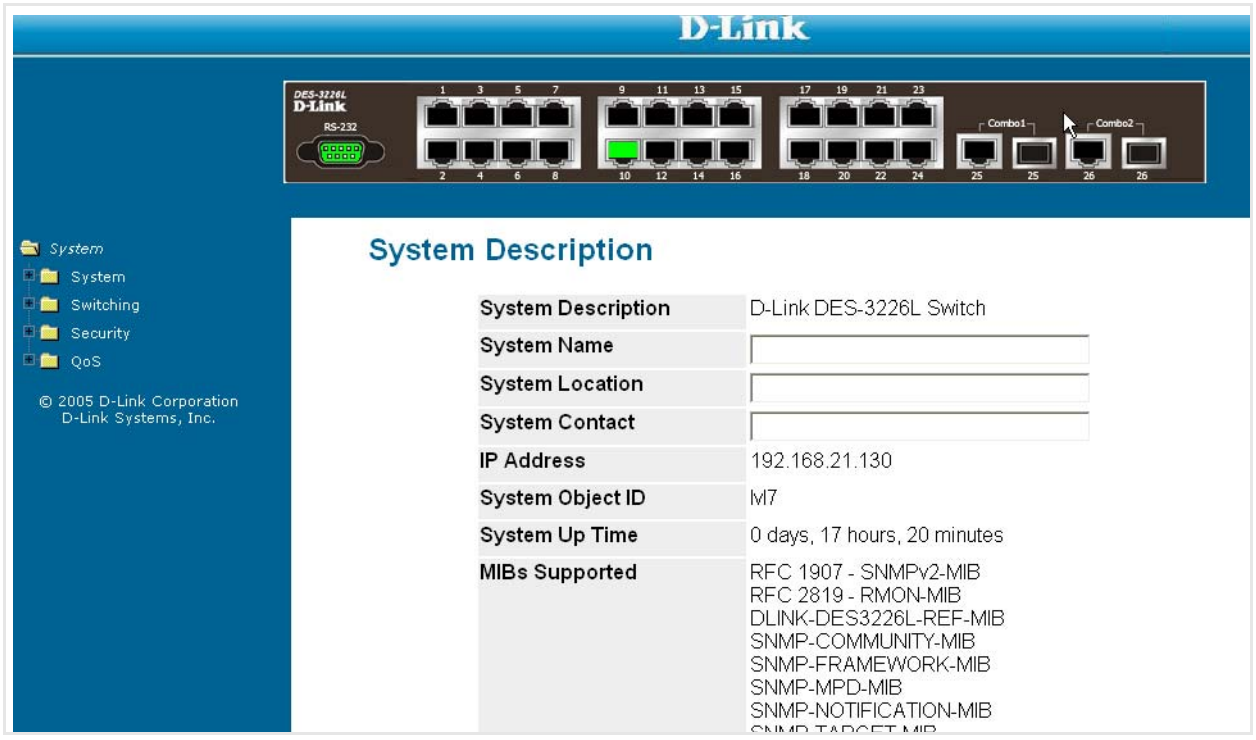
A Web interface panel for the switch Web page consists of three areas (Figure 9).

A banner graphic of the switch appears across the top of the panel.

The second area, a hierarchical-tree view appears to the left of the panel. The tree consists of a combination of folders, subfolders, and configuration and status HTML pages. You can think of the folders and subfolders as branches and the configuration and status HTML pages as leafs. Only the selection of a leaf (not a folder or subfolder) will cause the display of a new HTML page. A folder or subfolder has no corresponding HTML page.

The third area, at the bottom-right of the panel, displays the currently selected device configuration status and/or the user configurable information that you have selected from the tree view.

Figure 9. Web Interface Panel-Example



Starting the Web Interface

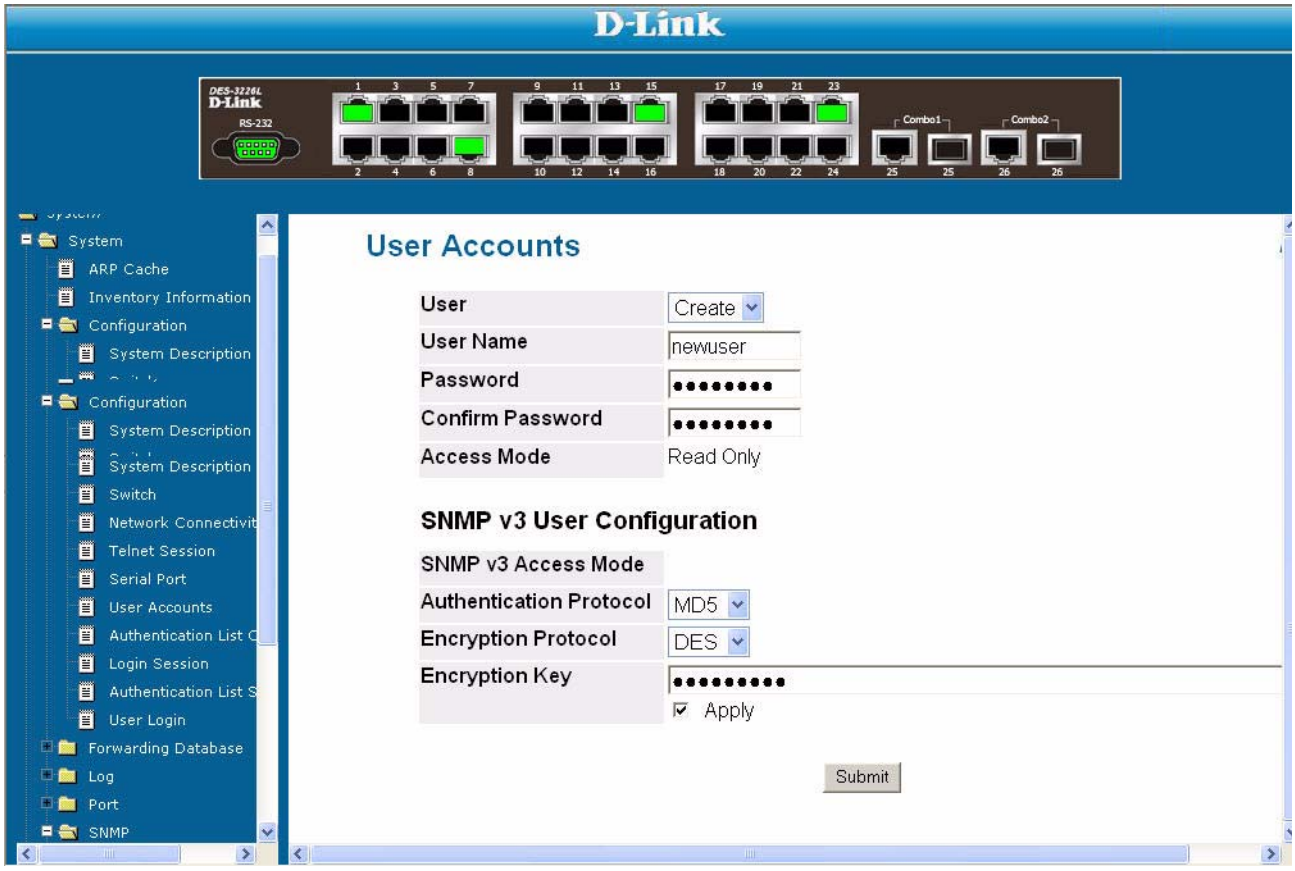
Follow these steps to start the switch DES-3226L Web interface:

1. Enter the IP address of the switch in the Web browser address field.
2. When the Login panel is displayed, click **Login**, then enter the appropriate User Name and Password. The User Name and associated Password are the same as those used for the terminal interface. Click on the Login button. The System Description Menu displays as shown in Figure 9, with the navigation tree appearing to the left of the screen.
3. Make a selection by clicking on the appropriate item in the navigation tree.
4. Configuring an SNMP V3 User Profile

Configuring an SNMP V3 user profile is a part of user configuration. Any user can connect to the D-Link DES-3226L switch using the SNMPv3 protocol, but for authentication and encryption, additional steps are needed. Use the following steps to configure an SNMP V3 new user profile.

1. Select **System>Configuration>User Accounts** from the hierarchical tree on the left side of the web interface (see Figure 10).

Figure 10. Configuring an SNMP V3 User Profile



2. Using the **User** pulldown menu, select **Create** to create a new user.
3. Enter a new user name in the User Name field.
4. Enter a new user password in the Password field and then retype it in the Confirm Password field.

NOTE: If SNMPv3 Authentication is to be used for this user, the password must be eight or more alphanumeric characters.

5. If you do not need authentication, go to Step 9.
6. To enable authentication, use the **Authentication Protocol** pulldown menu to select either MD5 or SHA for the authentication protocol.
7. If you do not need encryption, go to Step 9.
8. To enable encryption, use the **Encryption Protocol** pulldown menu to select **DES** for the encryption scheme. Then, enter in the Encryption Key field an encryption code of eight or more alphanumeric characters.
9. Click **Submit**.

Command Buttons

The following command buttons are used throughout the Web interface panels for the switch:

Save Pressing the Save button implements and saves the changes you just made. Some settings may require you to reset the system in order for them to take effect.

Refresh Pressing the Refresh button that appears next to the Apply button in Web interface panels refreshes the data on the panel.

Submit Pressing the Submit button sends the updated configuration to the switch. Configuration changes take effect immediately, but these changes are not retained across a power cycle unless a save is performed.

IGMP Snooping

This section describes the Internet Group Management Protocol (IGMP) feature: IGMPv3 and IGMP Snooping.

Overview

IGMP:

- Uses Version 3 of IGMP
- Includes snooping
- Snooping can be enabled per VLAN

CLI Examples

The following are examples of the commands used in the IGMP Snooping feature.

Example #1: show igmpsnooping

```
(Console)              #show igmpsnooping?

<cr>              Press Enter to execute the command.
<slot/port>       Enter interface in slot/port format.
mrouter           Display IGMP Snooping Multicast Router information.
<1-4093>          Display IGMP Snooping valid VLAN ID information.

(Console)              #show igmpsnooping

Admin Mode.............................Enable
Multicast Control Frame Count............0
Interfaces Enabled for IGMP Snooping.....0/10
Vlans enabled for IGMP snooping..........20
```

Example #2: show mac-address-table igmpsnooping

```
(Console)              #show ip igmp interface?

      MAC Address          TypeDescriptionInterfaces
----------------------  --------------------------------
00:01:01:00:5E:00:01:16  DynamicNetwork AssistFwd: 0/47
00:01:01:00:5E:00:01:18  DynamicNetwork AssistFwd: 0/47
00:01:01:00:5E:37:96:D0  DynamicNetwork AssistFwd: 0/47
00:01:01:00:5E:7F:FF:FA  DynamicNetwork AssistFwd: 0/47
00:01:01:00:5E:7F:FF:FE  DynamicNetwork AssistFwd: 0/47
```

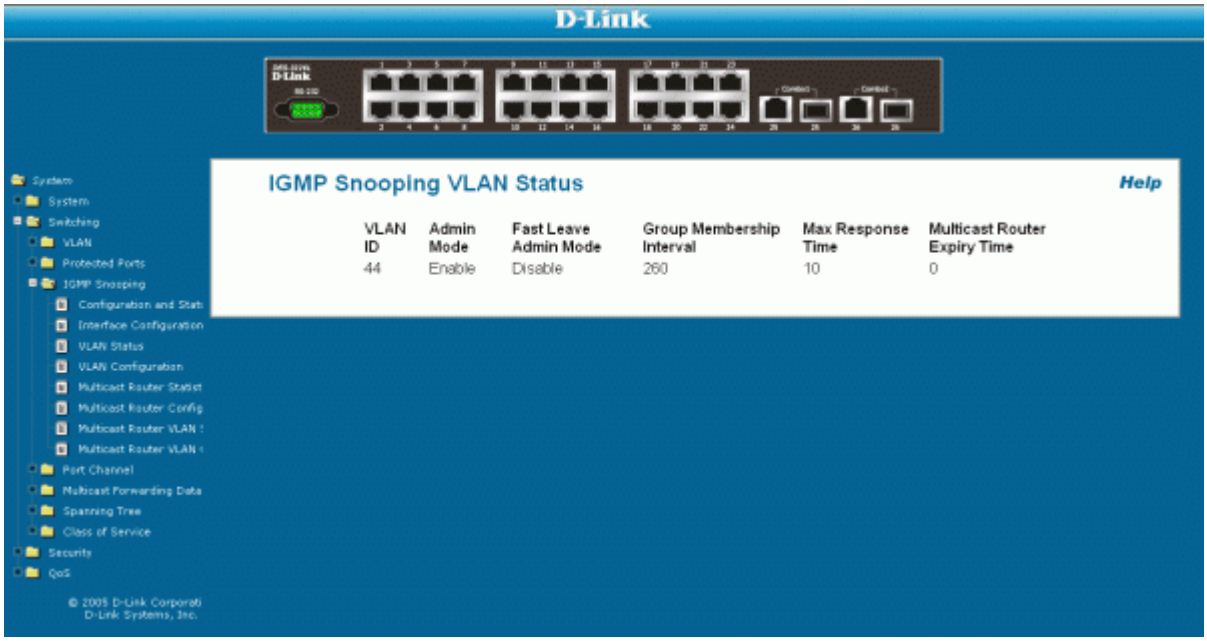
Web Examples

The following web pages are used in the IGMP Snooping feature. Click **Help** for more information on the web interface.

Figure 11. IGMP Snooping - Global Configuration and Status Page

Figure 12. IGMP Snooping - Interface Configuration Page

Figure 13. IGMP Snooping - VLAN Status Page



Configuration Scripting

This section describes the Configuration Scripting feature.

Overview

Configuration Scripting:

- Allows you to generate text-formatted files
- Provides scripts that can be uploaded and downloaded to the system
- Provides flexibility to create command configuration scripts
- May be applied to several switches
- Can save up to ten scripts or 500K of memory
- Provides List, Delete, Apply, Upload, Download
- Provides script format of one CLI command per line

Considerations

- Total number of scripts stored on box limited by NVRAM/FLASH size.
- Application of scripts is partial if script fails. For example, if the script executes five of ten commands and the script fails, the script stops at five.
- Scripts cannot be modified or deleted while being applied.
- Validation of scripts checks for syntax errors only. It does not validate that the script will run.

CLI Examples

The following are examples of the commands used for the Configuration Scripting feature.

Example #1: script

```
(Console)                    #script ?

apply       Applies configuration script to the switch.
delete      Deletes a configuration script file from the switch.
list        Lists all configuration script files present on the
            switch.
show        Displays the contents of configuration script.
validate    Validate the commands of configuration script.
```

Example #2: script list and script delete

```
(Console)                    #script list

Configuration Script Name    Size(Bytes)
-------------------------    -----------
basic.scr                           93
running-config.scr                3201

2 configuration script(s) found.
1020706 bytes free.

(Console)                    #script delete basic.scr

Are you sure you want to delete the configuration script(s)? (y/n) y

1 configuration script(s) deleted.
```

Example #3: script apply running-config.scr

```
(Console)                    #script apply running-config.scr

Are you sure you want to apply the configuration script? (y/n) y

The systems has unsaved changes.
Would you like to save them now? (y/n) y

Configuration Saved!
```

Example #4: Creating a Configuration Script

```
(Console)                    #show running-config running-config.scr

Config script created successfully.

(Console)                    #script list

Configuration Script Name    Size(Bytes)
-------------------------    ----------
running-config.scr           3201

1 configuration script(s) found.
1020799 bytes free.
```

Example #5: Upload a Configuration Script

```
(Console)                    #copy nvram: script running-config.scr
tftp://192.168.77.52/running-config.scr

Mode..........................  TFTP
Set TFTP Server IP............  192.168.77.52
TFTP Path.....................  ./
TFTP Filename.................  running-config.scr
Data Type.....................  Config Script
Source Filename...............  running-config.scr

Are you sure you want to start? (y/n) y

File transfer operation completed successfully.
```

Example #6: script validate running-config.scr

```
(Console)                    #script validate running-config.scr
network protocol dhcp
no network javamode
vlan database
exit
configure
stack
member 2 1
exit
logging buffered
logging host 192.168.77.151

Configuration script ‘running-config.scr’ validated.

(Console) #script apply running-config.scr

Are you sure you want to apply the configuration script? (y/n) y
The system has unsaved changes.
Would you like to save them now? (y/n) y
Configuration Saved!
```

Example #7: Validate another Configuration Script

```
(Console) #script validate default.scr

network parms 172.30.4.2 255.255.255.0 0.0.0.0
vlan database
exit
configure
lineconfig
exit
spanning-tree configuration name 00-18-00-00-00-10
interface 0/1
exit
interface 0/2
exit
interface 0/3
exit
... continues through interface 0/26 ...
exit
exit
Configuration script 'default.scr' validation succeeded.
```

Port Mirroring

This section describes the Port Mirroring feature.

Overview

Port Mirroring:

- Allows you to monitor network traffic with an external network analyzer
- Forwards a copy of each incoming and outgoing packet to a specific port
- Is used as a diagnostic tool, debugging feature or means of fending off attacks
- Assigns a specific port to copy all packets to
- Allows inbound or outbound packets to switch to their destination and to be copied to the mirrored port

CLI Examples

The following are examples of the commands used in the Port Mirroring feature.

Example #1: show monitor session

```
(Console)                    #show monitor session 1

Session ID     Admin Mode     Probe Port     Mirrored Port
----------     ----------     ----------     -------------
1              Enable         0/5            0/4
```

NOTE: Monitor session ID “1” - “1” is a hardware limitation.

Example #2: show port all

```
(Console)                    #show port all

                Admin   PhysicalPhysicalLink   Link     LACP
Intf    Type    Mode    Mode    StatusStatus   Trap     Mode
----    ----    ------  ----------------------- ----            ----
0/1             Enable  Auto          Down     Enable   Enable
0/2             Enable  Auto          Down     Enable   Enable
0/3             Enable  Auto          Down     Enable   Enable
0/4     Mirror  Enable  Auto          Down     Enable   Enable
0/5     Probe   Enable  Auto          Down     Enable   Enable
0/6             Enable  Auto          Down     Enable   Enable
0/7             Enable  Auto          Down     Enable   Enable
0/8             Enable  Auto          Down     Enable   Enable
0/10            Enable  Auto          Down     Enable   Enable
```

Example #3: show port interface

Use this command for a specific port. The output shows whether the port is the mirror or the probe port, what is enabled or disable on the port, etc.

```
(Console)                          #show port 0/4

                  Admin    Physical PhysicalLink     Link       LACP
Intf     Type     Mode     Mode     Status           Trap       Mode
----     ----     ------   -------- --------------   ----       ----
0/4      Mirror   Enable   Auto            Down      Enable     Enable


(Console)                          #show port 0/5

                  Admin    Physical PhysicalLink     Link       LACP
Intf     Type     Mode     Mode     Status           Trap       Mode
----     ----     ------   -------- --------------   ----       ----
0/5      Probe    Enable   Auto            Down      Enable     Enable
```

Example #4: show monitor session 1

```
(Console)                          #show monitor session 1?

<cr>                             Press Enter to execute the command.

(Console)                          #show monitor session 1

Session ID       Admin Mode       Probe Port       Mirrored Port
----------       ----------       ----------       -------------
1                Enable           0/5              0/4
```

Example #5: (Config) monitor session 1 mode

To set up port mirroring, specify the monitor session, then the mode.

```
(Console)(Config)                  #monitor?
session                            Configure port mirroring.

(Console)(Config)                  #monitor session?
<1-1>                              Session number.

(Console)(Config)                  #monitor session 1?
destination                        Configure the probe interface.
mode                               Enable/Disable port mirroring session.
source                             Configure the source interface.

(Console)(Config)                  #monitor session 1 mode?
<cr>                               Press Enter to execute the command.
(Console)(Config)                  #monitor session 1 mode
```

Example #6: (Config) monitor session 1 source interface

Specify the source ports and destination port.

```
(Console)(Config)                    #monitor session 1 source?
interface                            Configure interface.

(Console)(Config)                    #monitor session 1 source interface?
<slot/port>                          Enter the interface.
(Console)(Config)                    #monitor session 1 source interface 0/4

(Console)(Config)                    #monitor session 1 destination?
interface                            Configure interface.

(Console)(Config)                    #monitor session 1 destination interface?
<slot/port>                          Enter the interface.
(Console)(Config)                    #monitor session 1 destination interface 0/5
```

Web Examples

The following web pages are used with the Port Mirroring feature.

Figure 14. System - Port Summary

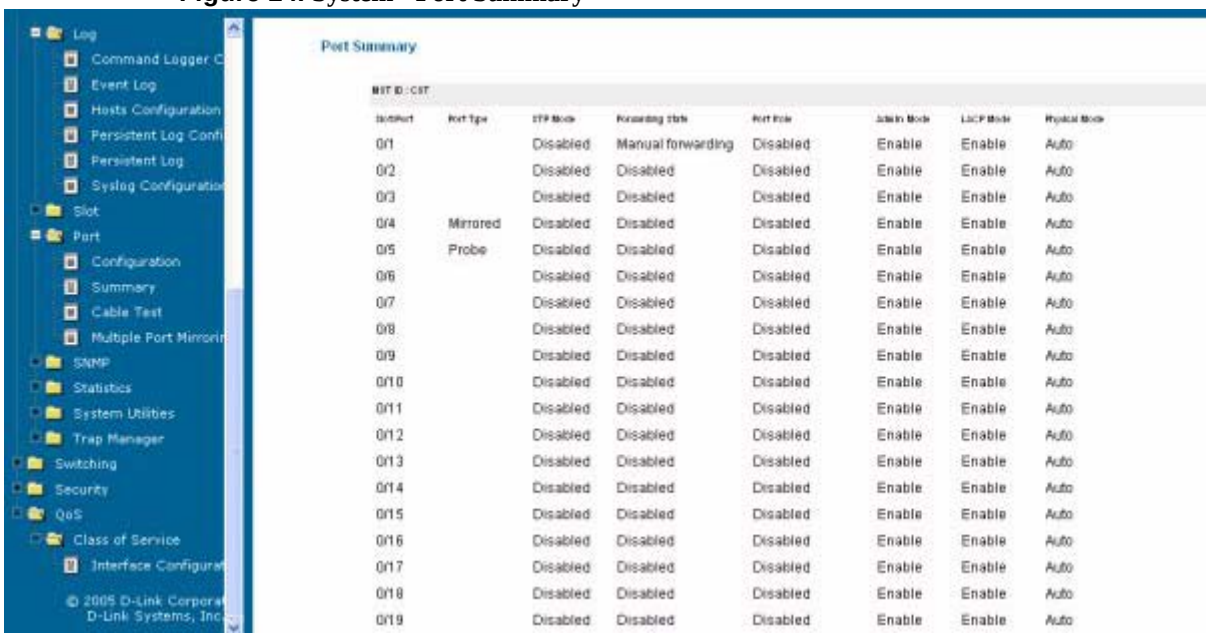
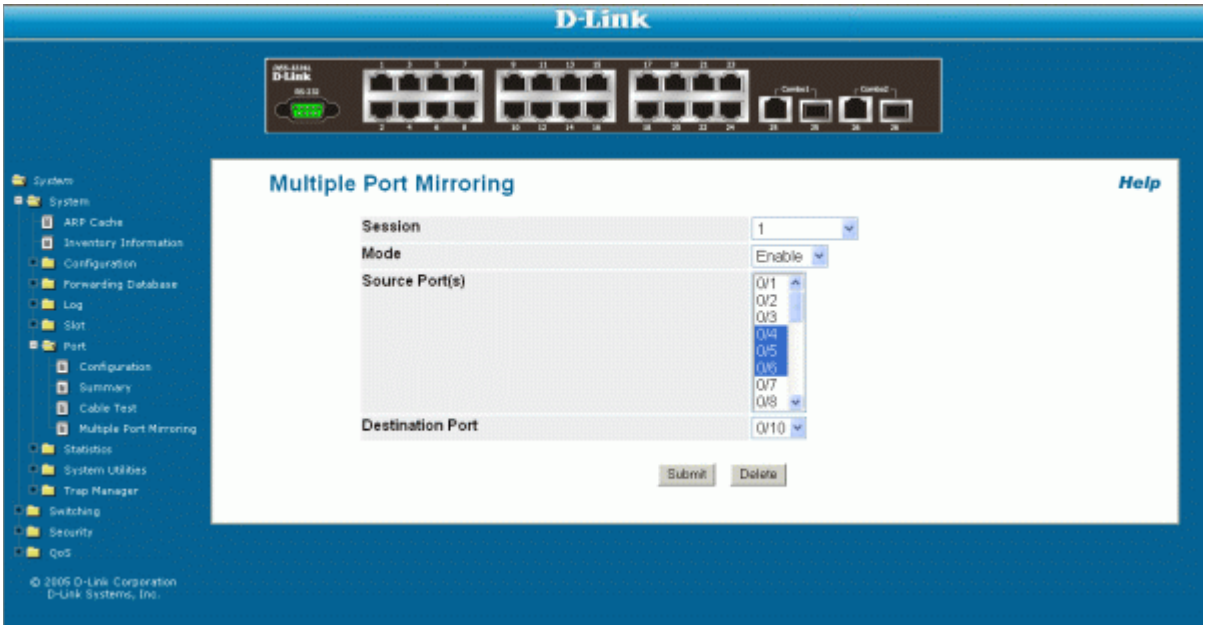

Log
Command Logger C
Event Log
Hosts Configuration
Persistent Log Confi
Persistent Log
Syslog Configuratio
Slot
Port
Configuration
Summary
Cable Test
Multiple Port Mirrorin
SNMP
Statistics
System Utilities
Trap Manager
Switching
Security
QoS
Class of Service
Interface Configurat
© 2005 D-Link Corporat
D-Link Systems, Inc
Port Summary
MST ID : CST
Disabled Manual forwarding Disabled Enable Enable Auto
0/2 Disabled Disabled Disabled Enable Enable Auto
0/3 Disabled Disabled Disabled Enable Enable Auto
0/4 Mirrored Disabled Disabled Disabled Enable Enable Auto
0/5 Probe Disabled Disabled Disabled Enable Enable Auto
0/6 Disabled Disabled Disabled Enable Enable Auto
0/7 Disabled Disabled Disabled Enable Enable Auto
0/8 Disabled Disabled Disabled Enable Enable Auto
0/9 Disabled Disabled Disabled Enable Enable Auto
0/10 Disabled Disabled Disabled Enable Enable Auto
0/11 Disabled Disabled Disabled Enable Enable Auto
0/12 Disabled Disabled Disabled Enable Enable Auto
0/13 Disabled Disabled Disabled Enable Enable Auto
0/14 Disabled Disabled Disabled Enable Enable Auto
0/15 Disabled Disabled Disabled Enable Enable Auto
0/16 Disabled Disabled Disabled Enable Enable Auto
0/17 Disabled Disabled Disabled Enable Enable Auto
0/18 Disabled Disabled Disabled Enable Enable Auto
0/19 Disabled Disabled Disabled Enable Enable Auto

Figure 15. System - Port - Multiple Port Mirroring



Syslog

This section provides information about the Syslog feature.

Overview

Syslog:

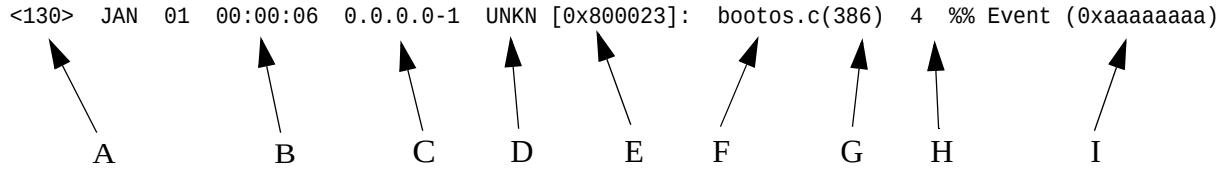
- Allows you to store system messages and/or errors
- Can store to local files on the switch or a remote server running a syslog daemon
- Method of collecting message logs from many systems

Persistent Log Files

- Currently three - one for each of the last three sessions
- Each log has two parts:
  - Start up log is the first 32 messages after system startup
  - Operational log is the last 32 messages received after the startup log is full
- Files are stored in ASCII format
  - slog0.txt - slog2.txt
  - olog0.txt - olog2.txt

  Where 0 is for the boot, 1 is for the last boot, 2 is for the boot before that, and the third one falls off.
- Can be saved to local server to monitor at a later point in time

Interpreting Log Files



A. Priority
B. Timestamp
C. Stack ID
D. Component Name
E. Thread ID
F. File Name
G. Line Number
H Sequence Number
I. Message

CLI Examples

The following are examples of the commands used in the Syslog feature.

Example #1: show logging

```
(Console)                                   #show logging

Logging Client Local Port                   :514
CLI Command Logging                         :disabled
Persistent Logging                          :enabled
Persistent Logging Severity Filter          :alert

Syslog Logging                              :disabled

Log Messages Received                       :66
Log Messages Dropped                        :0
Log Messages Relayed                        :0
Log Messages Ignored                        :0
```

Example #2: show logging persistent

```
(Console)                                   #show logging persistent

Persistent Logging                          :enabled
Persistent Logging Severity Filter          :alert
Persistent Log Count                        :2

<6> Jan  1 00:00:20 STK1 BOOT[83]: bootos.c(307) 0 %% Starting code...
<6> Jan  1 00:00:20 STK1 BOOT[83]: bootos.c(308) 1 %% rc = 10
```

Example #3: show logging traplogs

```
(Console)                                   #show logging traplogs?

<cr>                                        Press Enter to execute the command.

(Console)                                   #show logging traplogs

Number of Traps Since Last Reset.........   6
Trap Log Capacity.......................256
Number of Traps Since Log Last Viewed....   6

 Log System Up Time                         Trap
--- --------------                          ---------------------------------------
0 0 days 05:52:59                           Multiple Users: Unit: 1 Slot: 3 Port: 1
1 0 days 05:04:15                           Multiple Users: Unit: 1 Slot: 3 Port: 1
2 0 days 00:00:54                           Cold Start: Unit: 0
3 0 days 00:00:36                           Link Up: Unit: 1 Slot: 0 Port: 1
```

Example #4: logging port configuration

```
(Console)                                  #config

(Console) (Config)#                        logging ?

cli-command              CLI Command Logging Configuration.
host                     Enter IP Address for Logging Host
persistent               Logging Persistent Configuration.
syslog                   Syslog Configuration.

(Console) (Config)#                        logging host ?

<hostaddress>            Enter Logging Host IP Address
reconfigure              Logging Host Reconfiguration
remove                   Logging Host Removal

(Console) (Config)#                        logging host ?

<cr>                     Press Enter to execute the command.
<port>                   Enter Port Id

(Console) (Config)#                        logging host 10.254.24.153 4 ?

<cr>                     Press Enter to execute the command.
<severitylevel>          Enter Logging Severity Level (emergency|0, alert|1,
                         critical|2, error|3, warning|4, notice|5, info|6,
                         debug|7).

(Console) (Config)#                        logging host 10.254.24.153 4 1 ?

<cr>                     Press Enter to execute the command.

(Console) (Config)#                        logging host 10.254.24.153 4 1

(Console) (Config)#                        exit

(Console) (Config)#exit
```

Example #5: show logging hosts

```
(Console) #show logging hosts ?

<cr>                     Press Enter to execute the command.

(Console) #show logging hosts

Index     IP Address       Severity   Port     Status
-----  -----------------  ----------  ----  -------------
1      10.254.24.153      warning     7     Active
```

Web Examples

The following web pages are used in the Syslog feature.

Figure 16. Persistent Log Configuration Page

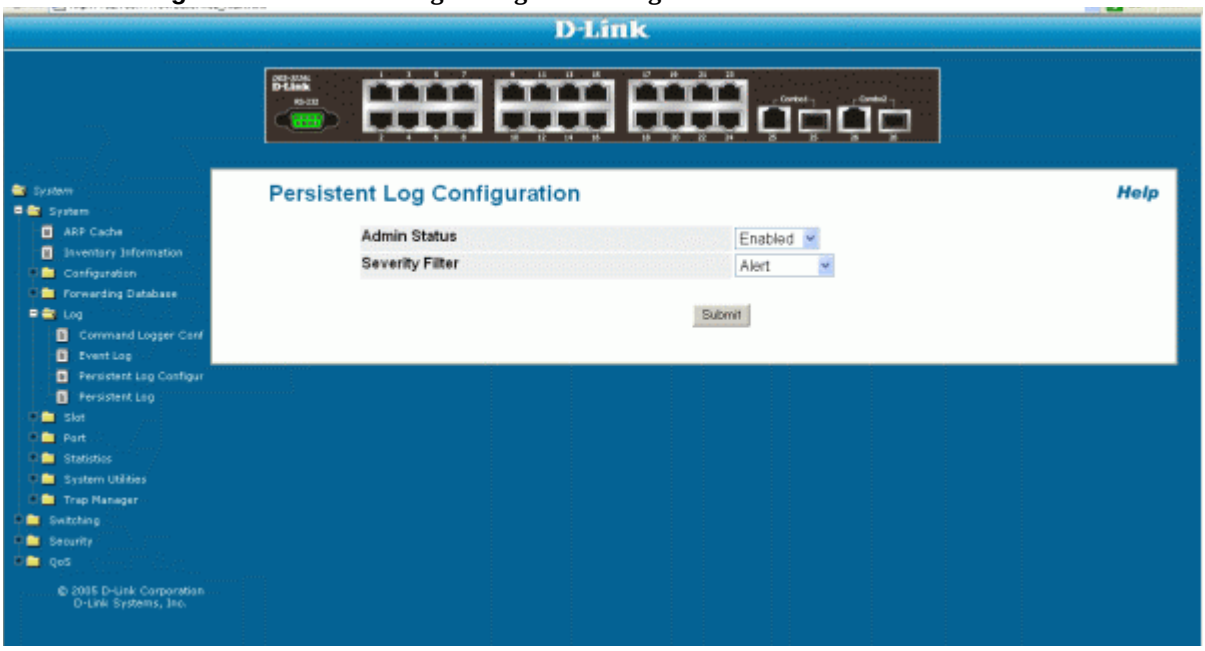
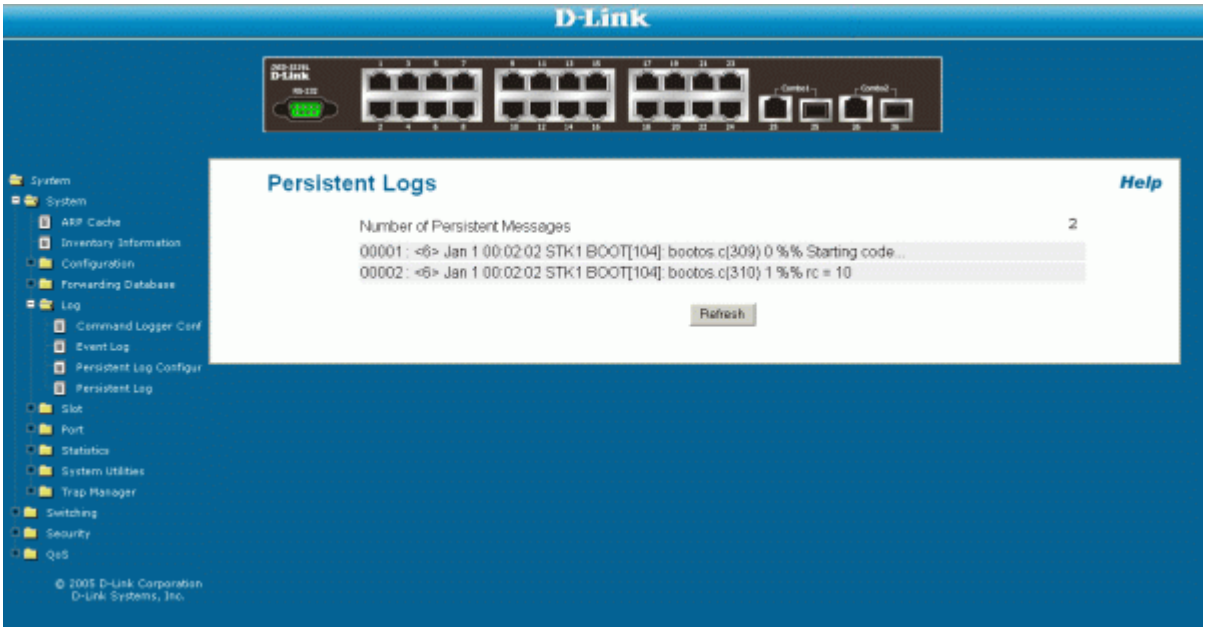


Figure 17. Persistent Logs



Traceroute

This section describes the Traceroute feature.

Traceroute Overview

Use Traceroute to discover the routes that packets take when traveling on a hop-by-hop basis to their destination through the network.

- Maps network routes by sending packets with small Time-to-Live (TTL) values and watches the ICMP time-out announcements
- Command displays all L3 devices
- Can be used to detect issues on the network
- Tracks up to 20 hops
- Default UPD port used 33343 unless modified in the traceroute command

NOTE: You can execute Traceroute with CLI commands only — there is no Web interface for this feature.

CLI Example

The following shows an example of using the traceroute command to determine how many hops there are to the destination.

The command output shows each IP address the packet passes through and how long it takes to get there. In this example, the packet takes 13 hops to reach its destination.

```
(Console)                              #traceroute?
<ipaddr>                               Enter IP address.
(Console)                              #traceroute 216.109.118.74 ?
<cr>                                   Press Enter to execute the command.
<port>                                 Enter port no.

(Console)                              #traceroute 216.109.118.74

Tracing route over a maximum of 20 hops

 1  10.254.24.1        40 ms       9 ms      10 ms
 2  10.254.253.1       30 ms      49 ms      21 ms
 3  63.237.23.33       29 ms      10 ms      10 ms
 4  63.144.4.1         39 ms      63 ms      67 ms
 5  63.144.1.141       70 ms      50 ms      50 ms
 6  205.171.21.89      39 ms      70 ms      50 ms
 7  205.171.8.154      70 ms      50 ms      70 ms
 8  205.171.8.222      70 ms      50 ms      80 ms
 9  205.171.251.34     60 ms      90 ms      50 ms
10  209.244.219.181    60 ms      70 ms      70 ms
11  209.244.11.9       60 ms      60 ms      50 ms
12  4.68.121.146       50 ms      70 ms      60 ms
13  4.79.228.2         60 ms      60 ms      60 ms
14  216.115.96.185    110 ms      59 ms      70 ms
15  216.109.120.203    70 ms      66 ms      95 ms
16  216.109.118.74     78 ms     121 ms      69 ms
```

Virtual LANs

Adding Virtual LAN (VLAN) support to a Layer 2 switch offers some of the benefits of both bridging and routing. Like a bridge, a VLAN switch forwards traffic based on the Layer 2 header, which is fast, and like a router, it partitions the network into logical segments, which provides better administration, security and management of multicast traffic.

A VLAN is a set of end stations and the switch ports that connect them. You may have many reasons for the logical division, such as department or project membership. The only physical requirement is that the end station and the port to which it is connected both belong to the same VLAN.

Each VLAN in a network has an associated VLAN ID, which appears in the IEEE 802.1Q tag in the Layer 2 header of packets transmitted on a VLAN. An end station may omit the tag, or the VLAN portion of the tag, in which case the first switch port to receive the packet may either reject it or insert a tag using its default VLAN ID. A given port may handle traffic for more than one VLAN, but it can only support one default VLAN ID.

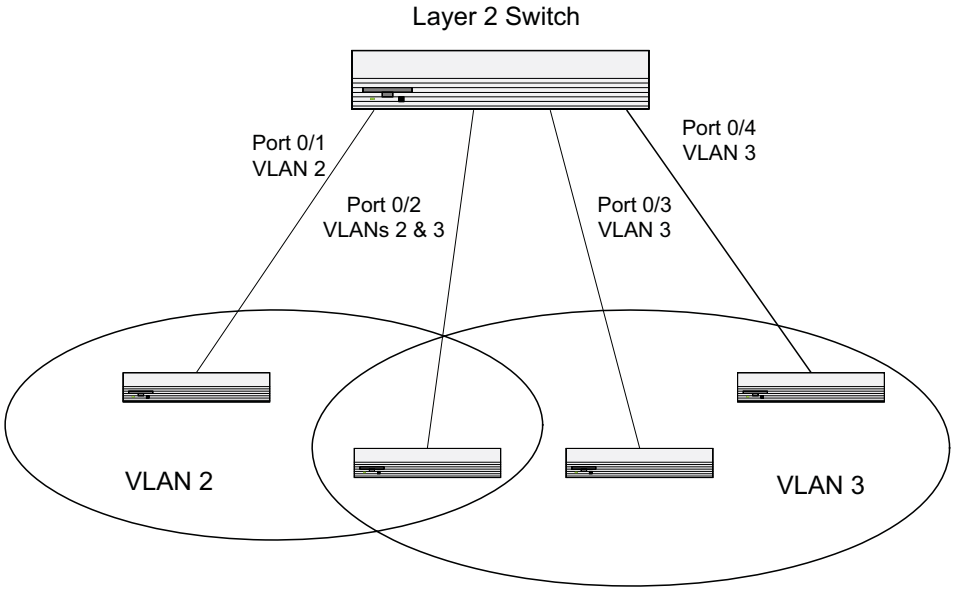
The Private Edge VLAN feature lets you set protection between ports located on the switch. This means that a protected port cannot forward traffic to another protected port on the same switch.

The feature does not provide protection between ports located on different switches.

VLAN Configuration Example

The diagram in this section shows a switch with four ports configured to handle the traffic for two VLANs. Port 0/2 handles traffic for both VLANs, while port 0/1 is a member of VLAN 2 only, and ports 0/3 and 0/4 are members of VLAN 3 only. The script following the diagram shows the commands you would use to configure the switch as shown in the diagram.

Figure 18. VLAN example network diagram



CLI Examples

The following examples show how to create VLANs, assign ports to the VLANs, and assign a VLAN as the default VLAN to a port.

Example #1: Create Two VLANs

Use the following commands to create two VLANs and to assign the VLAN IDs while leaving the names blank.

```
(Console) #vlan database
(Console) (Vlan)#vlan 2
(Console) (Vlan)#vlan 3
(Console) (Vlan)#exit
```

Example #2: Assign Ports to VLAN2

This sequence shows how to assign ports to VLAN2, specify that frames will always be transmitted tagged from all member ports, and that untagged frames will be rejected on receipt.

```
(Console) #config
(Console) (Config)#interface 0/1
(Console) (Interface 0/1)#vlan participation include 2
(Console) (Interface 0/1)#vlan acceptframe vlanonly
(Console) (Interface 0/1)#exit
(Console) (Config)#interface 0/2
(Console) (Interface 0/2)#vlan participation include 2
(Console) (Interface 0/2)#vlan acceptframe vlanonly
(Console) (Interface 0/2)#exit
(Console) (Config)#exit
```

```
(Console) #config
(Console) (Config)#vlan port tagging all 2
(Console) (Config)#exit
```

Example #3: Assign Ports to VLAN3

This example shows how to assign the ports that will belong to VLAN 3, and to specify that untagged frames will be accepted on port 0/4.

Note that port 0/2 belongs to both VLANs and that port 0/1 can never belong to VLAN 3.

```
(Console) #config
(Console) (Config)#interface 0/2
(Console) (Interface 0/2)#vlan participation include 3
(Console) (Interface 0/2)#exit
(Console) (Config)#interface 0/3
(Console) (Interface 0/3)#vlan participation include 3
(Console) (Interface 0/3)#exit
(Console) (Config)#interface 0/4
(Console) (Interface 0/4)#vlan participation include 3
(Console) (Interface 0/4)#exit
(Console) (Config)#
(Console) (Config)#exit
(Console) #config
(Console) (Config)#interface 0/4
(Console) (Interface 0/4)#vlan acceptframe all
(Console) (Interface 0/4)#exit
(Console) (Config)#exit
```

Example #4: Assign VLAN3 as the Default VLAN

This example shows how to assign VLAN 3 as the default VLAN for port 0/2.

```
(Console) #config
(Console) (Config)#interface 0/2
(Console) (Interface 0/2)#vlan pvid 3
(Console) (Interface 0/2)#exit
(Console) (Config)#exit
```

Graphical User Interface

Use the following screens to perform the same configuration using the Graphical User Interface:

- **Switching --> VLAN--> Configuration**. To create the VLANs and specify port participation.
- **Switching --> VLAN --> Port Configuration.** To specify the handling of untagged frames on receipt, and whether frames will be transmitted tagged or untagged.

Private Edge VLANs

Use the Private Edge VLAN feature to prevent ports on the switch from forwarding traffic to each other even if they are on the same VLAN.

- Protected ports cannot forward traffic to other protected ports in the same group, even if they have the same VLAN membership. Protected ports can forward traffic to unprotected ports in their group.
- Unprotected ports can forward traffic to both protected and unprotected ports.

You can also configure groups of protected ports. Each group's configuration consists of a name and a mask of ports. A port can belong to only one set of protected ports, but if a port is unprotected in one group it can be protected in another group.

The group name is configurable by the network administrator.

Use the *switchport protected* command to designate a port as protected. Use the *show switchport protected* command to display a listing of the protected ports.

CLI Example

Example #1: switchport protected

```
(Console) #config
(Console) (Config)#interface 0/1
(Console) (Interface 0/1)#switchport protected ?
<cr> Press Enter to execute the command.
(Console) (Interface 0/1)#switchport protected
```

Example #2: show switchport protected

```
(Console) #show switchport protected
0/1
```

Class of Service (CoS)

This section describes the Class of Service (CoS) Queue Mapping and CoS Interface Configuration features.

CoS Queue Mapping

You can configure ports as trusted or untrusted.

Trusted ports have the following features:

- Takes at face value certain priority designation for arriving packets
- Trust only applies to packets that have that trust information
- Can only have one trust field at a time
  - 802.1p User Priority (default trust mode - Managed through Switching configuration)
  - IP Precedence
  - IP DiffServ Code Point (DSCP)

Untrusted ports have the following features:

- No incoming packet priority designation is trusted, therefore the port default priority value is used
- All ingress packets from Untrusted ports, where the packet is classified by an ACL or a DiffServ policy, are directed to specific CoS queues on the appropriate egress port. That specific CoS queue is determined by either the default priority of the port or a DiffServ or ACL.
- Used when trusted port mapping is unable to be honored - i.e. when a non-IP packet arrives at a port configured to trust IP precedence or IP DSCP

Packets arriving at the port ingress are inspected and their trusted field value is used to designate the CoS queue where the packet is placed when forwarded to the appropriate egress port. You configure a CoS mapping table to associate the trusted field value with the desired CoS queue.

The three internal traffic class queues available are:

- Queue 2 - Minimum of 50% of available bandwidth
- Queue 1 - Minimum of 33% of available bandwidth
- Queue 0 - Lowest priority, minimum of 17% of available bandwidth

For untagged traffic, you can specify default 802.1p priority on a per-port basis.

NOTE: From the Web interface, you map IP Precedence and IP DSCP values to the internal traffic classes on the QoS > Class of Service > Mapping Table Configuration page and you map 802.1p priority values to the traffic classes on the Switching > Class of Service > 802.1p Priority Mapping page.

CLI Examples

The following are examples of the commands used in the CoS Queuing feature.

Example #1 classofservice dot1p-mapping

Use the following command to enter the 802.1p priority and the traffic class queue.

```
(Console) (Config)#classofservice dot1p-mapping ?
<0-7>                   Enter the 802.1p priority.
(Console) (Config)#classofservice dot1p-mapping 1 ?
<0-2>                   Enter the traffic class to map the 802.1p priority to.
(Console) (Config)#classofservice dot1p-mapping 1 2 ?
<cr>                    Press Enter to execute the command.
(Console) (Config)#classofservice dot1p-mapping 1 2
(Console) (Config)#exit
```

Example #2: show classofservice dot1p-mapping

```
(Console) #show classofservice dot1p-mapping

 User Priority    Traffic Class
 -------------    -------------
       0                1
       1                2
       2                0
       3                1
       4                2
       5                2
       6                2
       7                2
```

Example #3: show classofservice trust

```
(Console) #show classofservice ?

dot1p-mapping            Display 802.1p priority mapping information.
ip-dscp-mapping          Display IP DSCP Information
ip-precedence-mapping    Display ClassofService IP Precedence Information
trust                    Display ClassofService Trust Information

(Console)                              #show classofservice trust ?
<cr>                                   Press Enter to execute the command.
(Console)                              #show classofservice trust
Class of Service Trust Mode:           Dot1P
```

Traffic Shaping and Rate Limiting

Traffic shaping controls the amount and volume of traffic transmitted through a network. This has the effect of smoothing temporary traffic bursts over time.

Rate limiting specifies the maximum ingress bandwidth allowed, typically used to rate limit the inbound transmission rate. This value is controlled independently of any per-flow input policing configurations. It is effectively a hard-limit for allowed ingress traffic rate.

traffic-shape

Use this command to enable traffic shaping by specifying the maximum transmission bandwidth limit for all interfaces (Global Config) or for a single interface (Interface Config).

The <*0-100*> value is the percentage of port speed. For example, a value of 20 means the port speed for egress traffic is at 20% of the maximum rate. The <**rate** *0-10000000*> is the absolute bandwidth value of the port in kilobits per second in increments of 64 kbps. The default bandwidth value is 0, meaning no upper limit is enforced, which allows the interface to transmit up to its maximum line rate.

The bandwidth value is independent of any per-queue maximum bandwidth value(s) in effect for the interface and should be considered as a second-level transmission rate control mechanism that regulates the output of the entire interface regardless of which queues originate the outbound traffic.

Format **traffic-shape** *{<0-100>* | **rate** *<0-10000000>}*

Modes **Global Config**
Interface Config

rate-limit

This command allows you to limit the rate of ingress traffic arriving on the port. You can set the rate on a per-port basis or on all ports. The *<0-100>* value is the percentage of bandwidth to limit. For example, a value of 20 means that the port speed for ingress traffic is at 20% of the maximum rate. The <**rate** *0-10000000*> value is the absolute bandwidth value in increments of 64 kbps.

The default ingress rate shaping value is 0, meaning no upper limit is enforced, which allows the port to accept up to its maximum traffic rate.

Default 0

Format **rate-limit** *{<0-100>* | *rate <0-10000000>}*

Modes **Global Config**
Interface Config

To verify the traffic-shape and rate limit values, from Privileged Exec mode enter:

show interfaces cos-queue - shows traffic-shape value for all interfaces

show interface cos-queue <*slot/port*> - shows traffic-shape value for the specified interface.

Example #4 (Interface Config) traffic-shape

```
(Console) #config
(Console) (Config)#interface 0/1
(Console) (Interface 0/1)#traffic-shape 60
(Console) (Interface 0/1)#exit
(Console) (Config)#exit
```

Example #5 show interfaces cos-queue slot/port

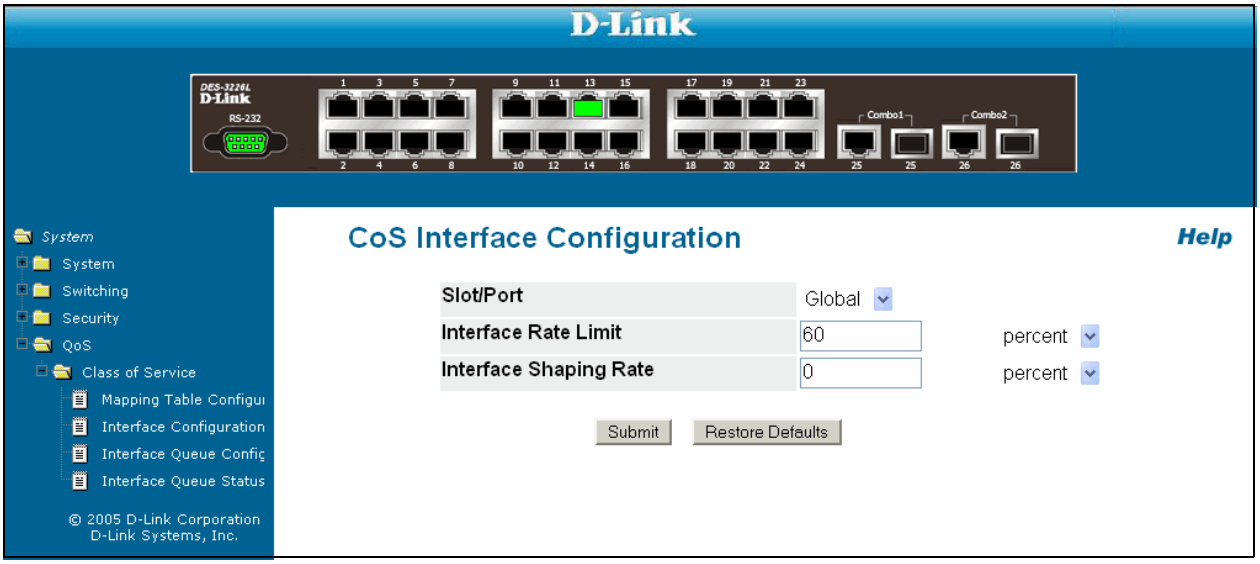
```
(Console) #show interfaces cos-queue 0/1

Interface..................................... 0/1
Interface Rate Limit.......................... 0 percent
Interface Shaping Rate........................ 60 percent
```

```
Queue Id   Min. Bandwidth   Scheduler Type   Queue Management Type
--------   --------------   --------------   ---------------------
0          0                Weighted         Tail Drop
1          0                Weighted         Tail Drop
2          0                Weighted         Tail Drop
```

Web Example

Figure 19 shows the CoS Interface configuration Web page with an interface rate limit of 60%. In this example, the Slot/Port field is set to Global, which means the interface rate limit is applied to all ports on the system.

Figure 19. CoS Interface Configuration



Link Aggregation

This section includes instructions on configuring Link Aggregation using the Command Line Interface and the Graphical User Interface.

Link Aggregation

Link Aggregation (LAG) allows the switch to treat multiple physical links between two end-points as a single logical link. All of the physical links in a given LAG must operate in full-duplex mode at the same speed.

Link Aggregation can be used to directly connect two switches when the traffic between them requires high bandwidth and reliability, or to provide a higher bandwidth connection to a public network. LAG offers the following benefits:

- Increased reliability and availability -- if one of the physical links in the LAG goes down, traffic is dynamically and transparently reassigned to one of the other physical links.
- Better use of physical resources -- traffic can be load-balanced across the physical links.
- Increased bandwidth -- the aggregated physical links deliver higher bandwidth than each individual link.
- Incremental increase in bandwidth -- A physical upgrade could produce a 10-times increase in bandwidth; LAG produces a two- or five-times increase, useful if only a small increase is needed.

Management functions treat a LAG as if it were a single physical port.

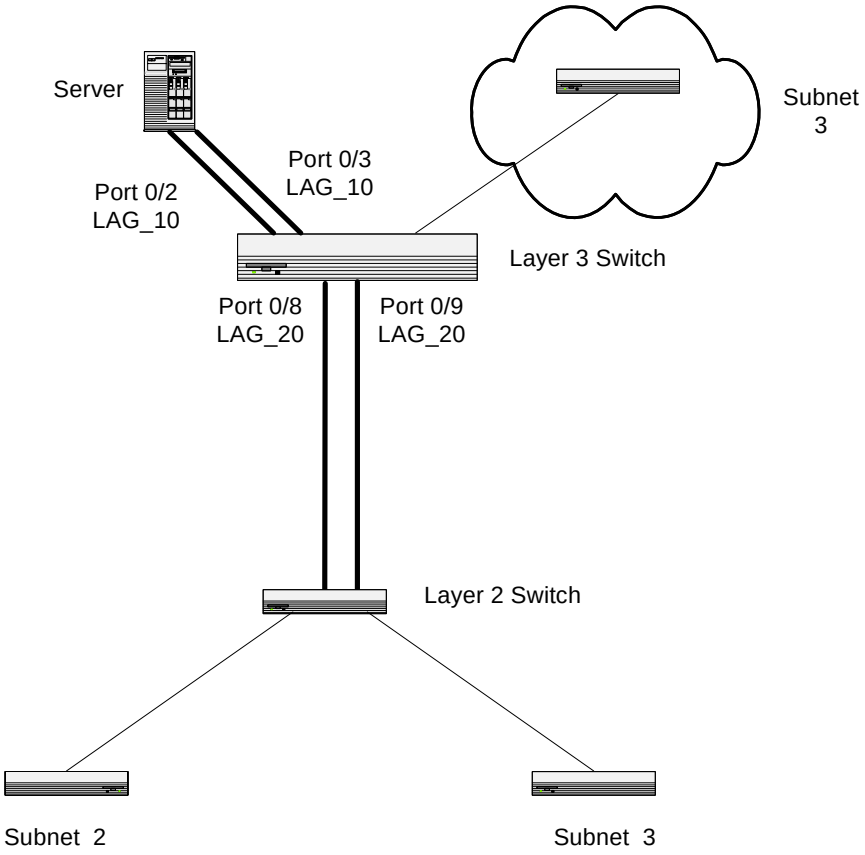
You can include a LAG in a VLAN. You can configure more than one LAG for a given switch.

Example #1: Link Aggregation Configuration Example

This section provides an example of configuring the software to support Link Aggregation (LAG) to a server and to a Layer 2 switch.

Figure 20 shows the example network.

Figure 20. LAG example network diagram



Create two LAGS:

```
(Console) #config
(Console) (Config)#port-channel lag_10
(Console) (Config)#port-channel lag_20
(Console) (Config)#exit
```

Use the **show port-channel all** command to show the logical interface ids you will use to identify the LAGs in subsequent commands. Assume that lag_10 is assigned id 1/1 and lag_20 is assigned id 1/2.

```
(Console) #show port-channel all

              Port-                    Link
Log.         Channel              Adm. Trap  STP            Mbr      Port     Port
Intf          Name         Link   Mode Mode  Mode   Type    Ports    Speed    Active
------ --------------- ------ ---- ---- ------ -------- ------ --------- ------
1/1    lag_10          Down   En.  En.  Dis.   Dynamic
1/2    lag_20          Down   En.  En.  Dis.   Dynamic
```

Add the ports to the appropriate LAG:

```
(Console) #config
(Console) (Config)#interface 0/2
(Console) (Interface 0/2)#addport 1/1
(Console) (Interface 0/2)#exit
(Console) (Config)#interface 0/3
(Console) (Interface 0/3)#addport 1/1
(Console) (Interface 0/3)#exit
(Console) (Config)#exit

(Console) #config
(Console) (Config)#interface 0/8
(Console) (Interface 0/8)#addport 1/2
(Console) (Interface 0/8)#exit
(Console) (Config)#interface 0/9
(Console) (Interface 0/9)#addport 1/2
(Console) (Interface 0/9)#exit
(Console) (Config)#exit
```

Enable both LAGs. By default, the system enables link trap notification

```
(Console) #config
(Console) (Config)#port-channel adminmode all
(Console) (Config)#exit
```

At this point, the LAGs could be added to VLANs.

To perform the same configuration using the Graphical User Interface, use:

Switching --> Link Aggregation --> Configuration.

To create the LAGs, specify port participation and enable LAG support on the switch.

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• Power supplies and fans: Three (3) Year

• Spare parts and spare kits: Ninety (90) days

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• The customer must obtain a Case ID Number from D-Link Technical Support at 1-877-453-5465, who will attempt to assist the customer in resolving any suspected defects with the product. If the product is considered defective, the customer must obtain a Return Material Authorization ("RMA") number by completing the RMA form and entering the assigned Case ID Number at https://rma.dlink.com/.

• After an RMA number is issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. Do not include any manuals or accessories in the shipping package. D-Link will only replace the defective portion of the product and will not ship back any accessories.

• The customer is responsible for all in-bound shipping charges to D-Link. No Cash on Delivery ("COD") is allowed. Products sent COD will either be rejected by D-Link or become the property of D-Link. Products shall be fully insured by the customer and shipped to D-Link Systems, Inc., 17595 Mt. Herrmann, Fountain Valley, CA 92708. D-Link will not be held responsible for any packages that are lost in transit to D-Link. The repaired or replaced packages will be shipped to the customer via UPS Ground or any common carrier selected by D-Link. Return shipping charges shall be prepaid by D-Link if you use an address in the United States, otherwise we will ship the product to you freight collect. Expedited shipping is available upon request and provided shipping charges are prepaid by the customer.

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• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.For detailed warranty information applicable to products purchased outside the United States, please contact the corresponding local D-Link office.

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numerosta
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Vardagar 08.00-20.00

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El Salvador: 800-6137	Monday to Friday 06:00am to 19:00pm
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Soporte Técnico Help Desk Perú:
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Das 8h30 às 18h30
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支援服務時間從
週一到週五，上午8:30 a.m. 到 7:00 p.m

Web: http://www.dlinktw.com.tw/
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Appendix A – Cables and Connectors

When connecting the Switch to another switch, a bridge or hub, a normal cable is necessary. Please review these products for matching cable pin assignment. The following diagrams and tables show the standard RJ-45 receptacle/connector and their pin assignments.

FIGURE 21. Standard RJ-45 Port and Connector

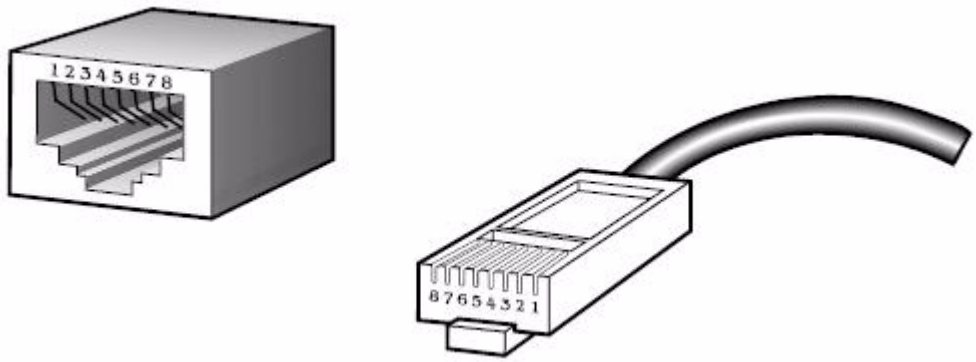

Table 6 shows the standard RJ-45 pin assignments.

Table 6. RJ-45 Pin Assignments

Contact	MDI-X Port	MDI-II Port
1	RD+ (receive)	TD+ (transmit)
2	RD- (receive)	TD- (transmit)
3	TD+ (transmit)	RD+ (receive)
4	Not used	Not used
5	Not used	Not used
6	TD- (transmit)	RD- (receive)
7	Not used	Not used
8	Not used	Not used

Appendix B – Connector Pinouts

The following tables show connector pinout information.

Table 7. Power Connector Pinouts: 6-pin Connector (5V)

Pin Number	Pin.1	Pin.2	Pin.3	Pin.4	Pin.5	Pin.6
Signal Name	VCC5	VCC5	VCC5	GND	GND	GND
Description	Power 5V in	Power 5V in	Power 5V in	Power 5V in	Power 5V in	Power 5V in

Table 8. RS-232 Connector Pinouts: 9-pin Connector

Pin Number	Pin.1	Pin.2	Pin.3	Pin.4	Pin.5	Pin.6	Pin.7	Pin.8	Pin.9
Signal Name	SDCD	SRXD	STXD	SDTR	GND	SDSR	SRTS	SCTS	SRI
Description	Carrier Detect	Receive Data	Trans-mit Data	Data Termi-nal Ready	Ground	Data Set Ready	Request to Send	Clear to Send	Ring Indica-tor

Table 9. Fan Connector Pinouts: 3-pin Connector

Pin Number	Pin.1	Pin.2	Pin.3
Signal Name	Detect	VCC5	GND
Description	Fail/OK Detect	Power 5V	Ground

Appendix C – Cable Lengths and Wavelengths

The following tables show maximum cable lengths and wavelengths.

Table 10. Maximum Cable Lengths

Standard	Media Type	Maximum Distance
Mini-SFP	1000BASE-LX, Single-mode fiber module	10km
	1000BASE-SX, Multi-mode fiber module	550m
	1000BASE-LH, Single-mode fiber module	40km
	1000BASE-ZX, Single-mode fiber module	80km
1000BASE-T	Category 5e UTP Cable Category 5 UTP Cable (1000 Mbps)	100m
100BASE-TX	Category 5 UTP Cable (100 Mbps)	100m
10BASE-T	Category 3 UTP Cable (10 Mbps)	100m

NOTE: Maximum distance depends on fiber size and manufacturer.

Table 11. Cable Wavelengths

	Wavelength
1000BASE-LX, Single-mode fiber module	1300
1000BASE-SX, Multi-mode fiber module	850
1000BASE-LHX, Single-mode fiber module	Not IEEE standard
1000BASE-ZX, Single-mode fiber module	Not IEEE standard

NOTE: Exact wavelength depends on the fiber module’s manufacturer.